

55-1510-201-20

TM 55-1510-201-20

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

**ORGANIZATIONAL MAINTENANCE
MANUAL
ARMY MODELS
U-8D, U-8G, RU-8D,
AND U-8F AIRCRAFT**

This copy is a reprint which includes current
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Chapter 11	11-67 and 11-68	11-67 and 11-68

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WARNING

Personnel performing instructions involving operations, procedures and practices which are included or implied in this technical manual shall observe the following instructions. Disregard of these warnings and precautionary information can cause serious injury, death, or an aborted mission.

STARTING AIRCRAFT

Exposure to exhaust gases should be avoided since some exhaust gases are an irritation to eyes and skin and may cause respiratory irritation.

OPERATION OF AIRCRAFT ON THE GROUND

Cool down. After engine operation, no work or inspection should be done in the exhaust duct area for at least one-half hour (preferably longer). If work is necessary immediately after shutdown, asbestos gloves must be worn.

Fuels and Lubricating Oils. All fuels have a drying effect which can injure the skin, therefore, avoid contact as much as possible.

GROUNDING AIRCRAFT

Prior to opening the fuel tank filler, the hose nozzle static ground wire must be attached to the grounded lugs that are located adjacent to filler openings.

Fuel tanks should not be drained near the end of the working day and then allowed to stand "empty" over night. Such action could make a perfect set of conditions for producing explosive vapors. The fact is that the system is not completely empty. Residue fuel drains down the sides of the tank and forms puddles. During the night fuel from these puddles evaporates into the air in the tank and if the critical fuel-air ratio develops an explosion could be set off by a spark. The remedy is to avoid such a lapse of time between draining and purging.

DANGEROUS VOLTAGES

Be careful when working around the 115-volt ac output of the inverters and 250-volt dc connections of the weather radar. The 115-volts ac is present throughout the electronic configuration wiring and in the ac junction boxes. The 250 volts dc is present in the Radar Set wiring.

FLAMMABLE MATERIAL

Make sure that Radar Sets and Tacan Navigational Sets are not operated when the aircraft is being refueled. Transmission could ignite the aircraft fuel.

RF BURNS

Do not stand in front of the AN/APN-158, AN/ASN-64, AN/ARC-102, ARC-59, AN/APX-44, AN/APX-72, AN/ARC-44, AN/ARC-73, AN/ARC-34, or AN/ARN-52 (V) antennas as applicable when they are transmitting.

USE OF FIRE EXTINGUISHERS IN CONFINED AREAS

Monobromotrifluoromethane (CF_3Br) is very volatile, but is not easily detected by its odor. Although non-toxic, it must be considered to be about the same as other freons and carbon dioxide, causing danger to personnel primarily by reduction of oxygen available for proper

USE OF FIRE EXTINGUISHERS IN CONFINED AREAS (Cont)

breathing. During operation of the fire extinguisher, ventilate personnel areas with fresh air. The liquid should not be allowed to come into contact with the skin, as it may cause frostbite or low temperature burns because of its very low boiling point.

HANDLING OXYGEN

Read the oxygen system safety precautions outlined in paragraph 1-146 carefully before attempting any maintenance on the system. Open all windows and doors to allow escaping oxygen to disperse. Insure that all electrical systems are OFF.

Do not use tape to cap open fittings.

Under no circumstances is an oily compound or sealer to be used.

Maintain 2-inch clearance between oxygen lines and electrical wiring or equipment. Where 2-inch clearance cannot be maintained, oxygen lines are to be wrapped with tape.

The presence of foreign matter in the high pressure lines can cause an explosion. When coming in contact with oxygen equipment, keep hands, tools and clothing absolutely clean.

SERVICING BATTERY

Improper service of the nickel-cadmium battery is dangerous for both bodily injury and equipment damage may result. Battery must be serviced by qualified personnel only.

CORROSIVE BATTERY ELECTROLYTE (POTASSIUM HYDROXIDE)

Wear rubber gloves, apron, and face shield when handling leaking batteries. If potassium hydroxide is spilled on clothing, or other material wash immediately with clean water. If spilled on personnel, immediately start flushing the affected area with copious amounts of clean water. Continue washing until medical assistance arrives.

SERVICING ALIGHTING GEAR

Before overinflating, check the tires for indications of breaks, and for wheel cracks. Stand in line with the tire rather than broad side of the wheel in order to avoid injury should the rim fail during overinflation. After tires are loosened from frozen ground, release pressure and inflate to proper pressure.

Because of the danger of the plug blowing free with sufficient force to injure servicing personnel, always loosen the plug just enough to allow the air pressure behind it to escape before completely removing the plug.

MAIN TORQUE KNEE ASSEMBLY

Release shock absorber assembly air pressure prior to torque knee assembly removal.

NOSE TORQUE KNEE ASSEMBLY

Release shock absorber assembly air pressure prior to torque knee assembly removal.

FILLING SHIMMY DAMPENER

Stand clear of the end of the piston, as the spring behind the disk will come out with considerable force.

REPLACEMENT OF STALL WARNING SWITCH

Before attempting to remove stall warning switch, determine if the switch heating circuit has been operating.

REPLACEMENT OF STALL WARNING SWITCH (Cont)

Allow the stall warning switch to cool before attempting adjustment.

RIGGING

Insure that ailerons and elevators respond properly to control wheel movement. Rotate control wheel counterclockwise (as viewed from pilot's seat) and check that one aileron is in up position while other is in down position. Rotate control wheel clockwise and check that up aileron is now down and down aileron is now up.

ELECTRICAL CONNECTIONS

Place BATTERY and GENERATOR switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers before attempting maintenance on any electrical connection or component of the aircraft.

WORKING ON ENGINE

Place applicable switches and circuit breakers in OFF position before working on electrical connections to engine accessories.

DEMOLITION

When shorting battery for destruction by fire hold wire with suitable material to prevent serious burns to hands.

NOISE

Sound pressure levels in this aircraft during some operating conditions exceed the Surgeon General's hearing conservation criteria, as defined in TB MED 251. Hearing protection devices, such as the aviator helmet or ear plugs are required to be worn by all personnel in and around the aircraft during its operation.

BATTERY ELECTROLYTE (NICKEL-CADMIUM)

The electrolyte used in nickel-cadmium batteries contains potassium hydroxide (KOH), which is a caustic chemical agent. Serious and deep burns of body tissue will result if the electrolyte comes in contact with the eyes or any part of the body. Use rubber gloves, rubber apron, and protective eye covering when handling the battery. If accidental contact with the electrolyte is made, use ONLY clean water and immediately (seconds count) flush contaminated areas. Continue flushing with large quantities of clean water. Seek medical attention immediately. Before removing or installing the battery, insure that the battery switch is off and the battery has cooled down if overheated. Removal or installation of the battery connector while the battery is under load may result in explosion, electrical arcing and possible severe burns to personnel.

WARNING

Some of the instruments contained in this aircraft, may contain radioactive materiel (see TB 55-1500-314-25 for listing). Do not attempt to disassemble these instruments. These items present no radiation hazard to personnel unless seal has been broken due to aging or has accidentally been broken. If seal is suspected to have been broken, do not remove instrument from aircraft until Base Radioactive Protective Officer has been consulted (AR 40-14). A beta-gamma radiac meter AN/PDR-27 or equivalent may be used to determine if the instrument contains the radioactive material (radium).

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CHAPTER 1

INTRODUCTION

SECTION I GENERAL INFORMATION

1-1. PURPOSE.

1-2. This manual, issued expressly for organizational maintenance, is the official document for the Army Models U-8D, U-8G, RU-8D, and U-8F aircraft. Throughout the manual, two electronics configurations are covered for U-8D and U-8F aircraft: the basic U-8D and U-8F configurations (STD) and the Authorized Standard Avionics Configuration (ASAC) for U-8D and U-8F aircraft. ASAC-peculiar data is so referenced throughout the text by the notation, "U-8D (ASAC)" or "U-8F (ASAC)," while basic aircraft data uses the notation, "U-8D (STD)" or "U-8F (STD)." In cases where text material is applicable to both configurations, the designation "U-8D" or "U-8F" is used. Serial effectivity for these aircraft may be found in table 1-1.

1-2A. The purpose of this manual is to supply organizational maintenance personnel with the maintenance functions to be performed at the second echelon maintenance level. A table of contents for this manual is provided to assist in determining the chapter in which individual functions are covered. The study and use of this manual will enable a maintenance crew of limited experience to perform the assigned functions with maximum efficiency. This manual provides all essential information for personnel to accomplish Army organizational maintenance on the complete air frame, its components, and systems with functions and related functions of the same general scope and magnitude, as prescribed for organizational maintenance activities in the Maintenance Allocation Chart (refer to Appendix B).

NOTE

Do not destroy any pages in this manual unless the data contained thereon has been replaced, superseded, or included in the manual by a change or revision.

1-3. DISTRIBUTION AND REVISIONS.

1-4. Distribution and revision of pages contained in this technical manual are accomplished in accordance with AR 310-1.

1-5. NOTES, CAUTIONS, AND WARNINGS.

1-6. Throughout this manual, reference is made to Notes, Cautions, and Warnings to emphasize important and critical instructions. The Notes, Cautions, and Warnings are used as applicable, for the following conditions:

NOTE

An operating procedure, condition, etc, which is essential to highlight.

CAUTION

Operating procedures, practices, etc, which if not strictly observed, will result in damage to or destruction of equipment.

WARNING

Operating procedures, practices, etc, which if not strictly observed, may result in personal injury or loss of life.

1-7. AUTHORIZATION FOR ISSUE.

1-8. Authorization for issue of this technical manual will be made in accordance with AR 310-3.

1-9. REQUIREMENTS FOR REPORTING RECOMMENDATIONS AND COMMENTS.

1-10. The direct reporting of errors, omissions, and recommendations for improving this manual by the individual user is authorized and encouraged. DA Form 2028 (Recommended Changes To DA Publications) will be used for reporting these improvements. This form may be completed using pen, pencil, or typewriter. DA Form 2028 will be completed by the individual using this manual and forwarded directly to: Commander, US Army Aviation Systems Command, ATTN: DRSAB-MPSD, 4300 Goodfellow Blvd, St. Louis, MO 63120.

1-10A. All requests for engineering authorization, when required by this manual, will be forwarded to USA TSARCOM, ATTN: DRSTS-MEA, 4300 Goodfellow Blvd., St. Louis, Mo., 63120. Urgent requests shall be clearly identified to insure priority handling and response. The requests shall include detailed information on the problem, e.g. sketches, photographs, dimensional data, etc., to assist in the evaluation and prompt reply.

1-II. MANUAL ARRANGEMENT.

1-12. This organizational maintenance manual is divided into 16 chapters, 5 appendices, and an index. Each chapter, the appendices, and the index are described in the subsequent paragraphs.

1-13. CHAPTER 1 - INTRODUCTION.

1-14. Chapter 1 notes the intent of this technical manual, signifies the responsibilities for distribution and revision, and outlines the requirements for reporting recommendations and comments on the information contained therein. Each chapter in the manual is briefly described on ground handling methods, ground support equipment, servicing materials and instructions, electrical power loading chart, lubrication, and element effects on maintenance.

1-15. CHAPTER 2 - LUBRICATION INSTRUCTIONS.

1-16. Chapter 2 provides general lubrication requirements, procedures and precautions, service schedules, and lubrication charts essential to accomplish complete lubrication on the U-8 aircraft and its systems.

1-17. CHAPTER 3 - INSPECTION REQUIREMENTS.

1-18. Chapter 3 contains special and test flight inspection requirements and methods, specified inspection periods, and aircraft test flight inspection checksheets to assist organizational personnel in accomplishing inspections at specified intervals. Also included in this chapter are overhaul intervals and retirement schedules, for determining maximum authorized operating time of equipment and components of the aircraft, and standards and degrees of serviceability.

1-19. CHAPTER 4 - AIRFRAME AND ALIGHTING GEAR.

1-20. Chapter 4 provides a detailed and chronological description as to the method and procedures for organizational personnel to accomplish their assigned maintenance function on

each item or major component of the complete airframe and alighting gear. Chapter 4 is divided into six sections, each of which pertains to a specific area of the aircraft structure.

1-21. CHAPTER 5 - POWER PLANT AND RELATED SYSTEMS.

1-22. Chapter 5 is divided into ten sections, each of which discusses the individual systems comprising the power plant and related systems. Each section provides a description of the components and items comprising the system and furnishes complete maintenance instructions pertinent to the organizational level of maintenance.

1-23. CHAPTER 6 - HYDRAULIC AND PNEUMATIC SYSTEMS.

1-24. Chapter 6 contains a detailed description and maintenance procedures for each item of equipment or major component, and each unit thereof, of the hydraulic system. Section III, the pneumatic system, is not applicable to the U-8 aircraft.

1-25. CHAPTER 7 - POWER TRAIN SYSTEM.

1-26. Chapter 7 is not applicable to the U-8 aircraft.

1-27. CHAPTER 8 - PROPELLER, MAIN AND TAIL ROTOR GROUPS.

1-28. Chapter 8 provides maintenance instructions on the propeller, hub assembly, and propeller governor in accordance with the functions assigned to organizational maintenance personnel.

1-29. CHAPTER 9 - FLIGHT CONTROLS.

1-30. Chapter 9 is divided into two classifications, control surfaces and flight controls. Each section discusses and performs the task assigned to the organizational level of maintenance. Also included in this chapter are instructions for adjusting control cables of all moveable flight controls.

1-31. CHAPTER 10 - INSTRUMENTS.

1-32. Chapter 10 provides all the essential information on flight, navigation, engine, and miscellaneous instruments required by organizational maintenance personnel to perform their designated assignments.

1-33. CHAPTER 11 - UTILITY SYSTEMS.

1-34. Chapter 11 is divided into ten sections, each of which discusses an individual utility system, as applicable, on the U-8 aircraft. Each section contains the essential information pertinent to a specific utility system and to organizational maintenance personnel.

1-35. CHAPTER 12 - ELECTRICAL SYSTEMS.

1-36. Chapter 12 is divided into six sections, five of which pertain to different electrical systems applicable to the U-8 aircraft. Chapter 12, when used in conjunction with Chapter 13, provides organizational level maintenance with all information necessary to complete applicable maintenance on the electrical systems of U-8 aircraft.

1-37. CHAPTER 13 - WIRING DIAGRAMS.

1-38. Chapter 13 provides a complete set of wiring diagrams to assist organizational and higher levels of maintenance to perform their assigned maintenance functions.

1-39. CHAPTER 14 - AVIONICS, PHOTOGRAPHY, AND ARMAMENT.

1-40. Chapter 14 contains instructions for attaining information necessary for organizational maintenance on U-8 avionics and photographic systems. Armament systems are not applicable to U-8 aircraft.

1-41. CHAPTER 15 - EXTERNAL STORES - NON ARMAMENT.

1-42. Chapter 15 is not applicable to the U-8 aircraft.

1-43. CHAPTER 16 - STORAGE OF AIRCRAFT.

1-44. Chapter 16 provides all the essential information for maintenance personnel to prepare the U-8 aircraft for flyable, temporary, and limited storage and depreservation procedures. Also included in this chapter are the demolition methods and procedures for the U-8 aircraft.

1-45. APPENDIX A - REFERENCES.

1-46. Appendix A lists general official publications available and applicable to organizational personnel.

1-47. APPENDIX B - MAINTENANCE ALLOCATION CHART.

1-48. Appendix B provides a columnar listing of maintenance functions to be performed at given levels of maintenance.

1-49. APPENDIX C - AIRCRAFT INVENTORY MASTER GUIDE.

1-50. Appendix C lists those items of installed and loose equipment required by and authorized for using organizations to accomplish their primary or alternate mission.

1-51. APPENDIX D - WEIGHT AND BALANCE.

1-52. Appendix D refers organizational maintenance personnel to the proper reference for obtaining weight and balance information for the U-8 aircraft.

1-53. APPENDIX E - ILLUSTRATED FIELD MANUFACTURE ITEMS LIST.

1-54. Appendix E includes simplified line drawings and bills of materials for field manufacture of all items listed in TM 55-1510-201-20P bearing MO source code, and specified for inclusion by the Government.

1-55. INDEX.

1-56. The index lists, in alphabetical order, every important subject under the topic which may be of significance to organizational maintenance.

1-57. GROUND SUPPORT EQUIPMENT AND FLYAWAY ITEMS.

1-58. Typical ground support equipment and flyaway items are listed in table 1-2.

1-59. SERVICING MATERIALS.

1-60. Table 1-3 contains a list of materials necessary to service the aircraft. Complete servicing instructions are given in paragraph 1-117.

1-61. ELECTRICAL POWER LOADING CHART.

1-62. Tabulation of the power input requirements and electrical load drawn by each item of electrical equipment is contained in table 1-4.

1-63. ELEMENT EFFECTS ON MAINTENANCE.

1-64. Numerous environmental conditions affect maintenance in many different ways. Sand and dust can penetrate every crack and crevice and cause equipment failure (electronic and mechanical). Bright sunlight and intense heat can cause rubber to crack and deteriorate, coated fabrics to become brittle, and engines and/or other equipment to overheat. Moisture can cause corrosion of metal parts. Salt water spray and air present an even more corrosive condition for metal parts.

NOTE

Extremely high humidity can exist within a closed aircraft when outside humidity is low.

Table 1-2. Ground support equipment and flyaway items

PART NUMBER	NOMENCLATURE
50-590017	Towbar, Nose Wheel (Manual or Tractor)
50-59001	Towbar, Nose Wheel (Manual)
50-524257-17	Lock Assembly, Control Surfaces and Throttles
AN8015-2	Mooring Kit
43D22262	Spoiler Assembly, Aircraft Mooring
44G5478	Case Assembly, Canvas
2860	Stepladder
50-521186-21	Lock Assembly, Rudder

Table 1-3. Servicing materials

COMPONENTS	NOMENCLATURE	SPECIFICATION
Fuel System	Gasoline, Aviation	MIL-G-5572, Grade 115/145
	Alternate Fuel, Gasoline Aviation	MIL-G-5572, Grade 100/130
Engine Oil System	Lubricating Oil Aircraft	*MIL-L-6082, Grade 1065
	Reciprocating Engine	
	Lubricating Oil, General Purpose	**MIL-L-15016, Grade 3050
Hydraulic System	Hydraulic Fluid, Petroleum Base	MIL-H-5606
Anti-Icing System	Isopropyl Alcohol	TT-1-735
Oxygen System	Oxygen, Technical	BB-0-925
Battery (Lead Acid)	Battery Water	0-B-41
Battery, (Nickel Cadmium)		
*MIL-L-6082 is being replaced by MIL-L-22851. Issue until exhausted. MIL-L-22851, Type II or MIL-L-6082, Grade 1100 above +30° F. MIL-L-22851, Type III or MIL-L-6082, Grade 1065 above +5° F. to +60° F.		
**MIL-L-15016, Grade 3050 below +5° F.		

Table 1-4. Electrical power loading chart (Sheet 1 of 8)

EQUIPMENT	PART DESCRIPTION	NO. OF UNITS PER AIR CRAFT	AMPERES PER UNIT
U-8D			
Flight Controls			
Wing Flap Motor	50-364090-608	1	3.5
Deicing and Anti-Icing			
Propeller Anti-Icing Pump	AN6100-1	1	1.2
Deicer Timer	42E06-9A	1	0.76
Engine Instruments			
Oil Temperature Indicator (Engine Gage Unit)	MS28043-1	2	0.1
Cylinder Head Temperature Indicator	202-2F1F-1A Edison	1	0.1
Carburetor Air Temperature Indicator	22-297-06	1	0.1
Tachometer Indicator	AN5530-2A12	1	
Flight Instruments			
Turn and Slip Indicator	MS28024-3	1	0.15
Altitude Indicator	656768	1	
Vertical Velocity Indicator	MS28049-1	1	
Landing Gear			
Landing Gear Retract Motor	50-810200-610	1	42.5
Landing Gear Control Relay	6046H39A Cutler-Hammer	1	0.95
Landing Gear Position Indicator	50-320214-1	1	
Fuselage Step			
Step Rotation Motor	50-364208	1	2.5
Step Slide Motor	50-364209-21	1	3.5
Heating and Ventilation			
Heater Blower Assembly	50-55098-1	1	10.0
Heater Fuel Solenoid Valve	12257-24	2	0.5
Heater Fuel Transfer Pump	476284	1	0.25
Heater Ignition Unit	A55A00	1	1.2
Pitot Tube Heater	782-2 Kollsman Instrument	1	3.33
Stall Warning Switch Heater	168-2 Safe Flight	1	1.6
Engine Controls			
Starter Motor	756-56B	2	80.0
Starter Relay	6041H189 Cutler-Hammer	2	0.34
Lighting			
Rotating Beacon (Stabilizer)	50-364224-19	1	
Tail Navigation Lamp	MS25219-1	1	0.8
Wing Navigation Lamp, RH	B6345-2-24	1	
Wing Navigation Lamp, LH	7955-1-24	1	0.75

Table 1-4. Electrical power loading chart (Sheet 2 of 8)

EQUIPMENT	PART DESCRIPTION	NO. OF UNITS PER AIR CRAFT	AMPERES PER UNIT
U-8D			
Landing Lamp	MS25241-4523	2	
Passing and Taxi Lamp	MS25243R4505	1	1.95
Compass Lamp	MS25237-327	1	0.04
Instrument Bolt Lamp	334 General Electric	43	0.04
Circuit Breaker Placard Lamp	MS25237-327	12	0.04
Map Lamp	AN3122-1524	1	0.75
Cabin Red Lamp	MS35478-307	2	0.65
Edge Lighted Panel Lamp	MS35478-327	39	0.65
Tab Position Indicator Lamp	MS25231-R313	2	0.04
Landing Gear Position Lamp	MS25237-327	3	0.04
Nose Baggage Compartment Lamp	305	1	0.3
Rear Baggage Compartment Lamp	305	1	0.3
Utility Lamp	MS25309-7512	1	0.04
Overhead Reading Lamp	MS25233-303	2	0.34
Cabin Step Lamp	MS25238-301	1	0.19
Outside Step Lamp	MS25235-311	1	1.5
Indicator Lamp	MS25237-327	5	0.04
Miscellaneous			
Cigarette Lighter	LPA-27630	3	1.5
Clock	AN5743T1A	1	
Landing Gear Warning Horn	MS25222-1	1	
DC Power			
Battery Charging	R33 Reading	2	
Battery Relay	6041H187	2	0.72
	Cutler-Hammer		
Reverse Current Relay	AN3025-100	2	1.9
Inverter (STD)	1-101A-115S-7 Eicor	2	9.2
Inverter (ASAC)	PU-544/A	2	45.00
Radio and Navigation			
ADF (Automatic Direction Finder)	AN/ARN-59	1 or 2	2.8
Marker Beacon	AN/ARN-12 or	1	1.5
	AN/ARN-32		
FM Liaison	AN/ARC-44	1	4.8
Glide Slope	AN/ARA-54	1	1.1
Omni	AN/ARN-30A/D/E	1 or 2	2.9
UHF Standby (STD)	AN/ARC-55	1	3.0
UHF Transmitter (STD)	AN/ARC-55	1	17.0
Directional Gyro Indicator	653894-2B	1	0.67
Emergency VHF Transmitter (STD)	T-366()/ARC	1	1.0
UHF Command Radio (ASAC)	AN/ARC-51BX	1	12.25
VHF FM Liaison Radio (ASAC)	AN/ARC-54 or AN/ARC-131	1	7.40
Intercommunication Set (ASAC)	C-1611()/AIC	2	0.20
Radio and Navigation			
TACAN Navigation (ASAC)	AN/ARN-52	1	2.20
Speech Security System (ASAC)	KY-28	1	4.00

Table 1-4. Electrical power loading chart (Sheet 3 of 8)

EQUIPMENT	PART DESCRIPTION	NO. OF UNITS PER AIR CRAFT	AMPERES PER UNIT
RMI Converter (ASAC)	CV-1275()/ARN	1 or 2	0.06
HF Command Radio	AN/ARC-102	1	35.0
IFF Transponder (ASAC)	AN/APX-72	1	2.80
VHF Radio System (ASAC)	AN/ARC-134	1	7.50
Gyro Magnetic Compass	AN/ASN-13	1	0.07
U-8F			
Flight Controls			
Wing Flap Motor	50-364090-608	1	3.5
Anti-Icing			
Propeller Anti-Icing Pump	AN6100-1	1	1.2
Windshield Anti-Icing Solenoid Valve	10-408	1	0.25
Engine Instruments			
Oil Temperature Indicator (Engine Gage Unit)	MS28043-1	2	0.1
Cylinder Head Temperature Indicator	202-2F1F1A Edison	1	0.1
Tachometer Indicator	AN5530-2A12	1	
Flight Instruments			
Turn and Slip Indicator	MS28024-3	1	0.15
Attitude Indicator	656768	1	
Vertical Velocity Indicator	MS28049-1	1	
Landing Gear			
Landing Gear Retract Motor	50-810200-610	1	42.5
Landing Gear Control Relay	6046H39A	1	0.95
	Cutler-Hammer		
Landing Gear Position Indicator	AN5839-1	3	
Heating and Ventilation			
Heater Blower Assembly	M4861H1A	1	15.0
	Dynamic Air		
Heater Ignitor	11C30	1	1.5
Fuel Valve	AV1B1474	1	0.5
	General Controls		
Heater Control Box	CYLZ5346	1	1.5
	Barber-Coleman		
Air Filter Motor	50-389006-3	2	0.45
Pitot Tube Heater	782-02	1	3.33
	Kollsman Instrument		
Stall Warning Switch Heater	168-2 Safe Flight	1	1.6
Engine Controls			
Starter Motor	G760 Eclipse-pioneer	2	80.0
Starter Relay	6041H189	2	0.34
	Cutler-Hammer		
Primer Valve	10-407	2	0.25
	Cutler-Hammer		

Table 1-4. Electrical power loading chart (Sheet 4 of 8)

EQUIPMENT	PART DESCRIPTION	NO. OF UNITS PER AIR CRAFT	AMPERES PER UNIT
Lighting			
Tail Navigation Lamp	MS25219-1	1	0.8
Wing Navigation Lamp, RH	B6345-2-24	1	3.2
Wing Navigation Lamp, LH	7955-1-24	1	
Rotating Beacon (Belly)	G7740-7-24	1	7.2
	Grimes		
Rotating Beacon (Stabilizer)	50-364224-19	1	
Indicator Lamp	MS25237-327	8	0.04
Instrument Lamp	MS25237-327	42	0.04
Panel Edge Lamp	MS25237-327	38	0.04
Cockpit Red Lamp	MS35478-307	2	0.8
Map Lamp	AN3122-1524	1	0.34
Cabin Dome Lamp	MS25231-313	4	0.68
Cabin Reading Lamp	MS25069-1495	4	0.8
Cabin Sign Lamp	MS25237-327	4	0.04
Utility Lamp	D6810-A Grimes	2	1.6
Threshold Lamp	MS25231-313	1	0.17
Landing Lamp	AN3129-4523	2	19.12
Taxi Lamp	4587 General Electric	1	3.6
Miscellaneous			
Cigarette Lighter	LPA-27630	1	1.5
Windshield Wiper Motor	XW20173M2	1	
Clock	AN5743T 1A	1	
Landing Gear Warning Horn	MS25222-1	1	
DC Power			
Battery	MA-7 or CA-7	1	
	Sonotone		
Battery Relay	6041H189	1	0.72
	Cutler-Hammer		
Reverse Current Relay	AN3025-100	2	1.9
Inverter (STD)	1-101A-115S-7 Elcor	1	9.2
Inverter (ASAC)	PU-544/A	2	45.00
Inverter (STD)	MS21983-1	1	9.2
Fuel			
Fuel Boost Pump	122723-112-01	4	6.2
Fuel Quantity Indicators	50-384001	4	1.0
Fuel Injection Pump	73229	1	
Radio and Navigation			
ADF (Auto Direction Finder)	AN/ARN-59	1 or 2	2.8
Marker Beacon	AN/ARN-32 or R-1041	1	1.5
Gyro Magnetic Compass	AN/ASN-13	1	0.07
FM Liaison (STD)	AN/ARC-44	1	4.8
Glide Slope	AN/ARA-54	1	1.1
Omni	AN/ARN-30A, 30D, -30E	1 or 2	2.9
UHF Standby (STD)	AN/ARC-55	1	3.0
UHF Transmitter (STD)	AN/ARC-55		17.0
Directional Gyro Indicator	653894-2B	1	0.67

Table 1-4. Electrical power loading chart (Sheet 5 of 8)

EQUIPMENT	PART DESCRIPTION	NO. OF UNITS PER AIR CRAFT	AMPERES PER UNIT
IFF Transponder (ASAC)	AN/APX-72	1	2.80
UHF Command Radio (ASAC)	AN/ARC-51BX	1	12.25
VHF FM Liaison Radio (ASAC)	AN/ARC-54 or AN/ARC-131	1	7.40
Intercommunication Set (ASAC)	C-1611()/AIC	2	0.20
TACAN Navigation (ASAC)	AN/ARN-52	1	2.20
Speech Security System (ASAC)	KY-28	1	4.00
HF Command Radio	AN/ARC-102	1	35.00
VHF Radio System (ASAC)	AN/ARC-134	1	7.50
RMI Converter (ASAC)	CV-1275()/ARN	2	0.06
U-8G			
Flight Controls			
Wing Flap Motor	50-364090-608	1	3.5
Deicing and Anti-Icing			
Propeller Anti-Icing Pump	AN6100-1	1	1.2
Deicer Timer	42E06-9A	1	0.76
Engine Instruments			
Oil Temperature Indicator (Engine Gage Unit)	MS28043-1	2	0.1
Cylinder Head Temperature Indicator	202-2F1F1A Edison	1	0.1
Carburetor Air Temperature Indicator	22-297-06	1	0.1
Tachometer Indicator	AN5530-2A12	1	
Flight Instruments			
Turn and Slip Indicator	MS28024-3	1	0.15
Altitude Indicator	656768	1	
Vertical Velocity Indicator	MS28049-1	1	
Landing Gear			
Landing Gear Retract Motor	50-810200-610	1	42.5
Landing Gear Control Relay	6046H39A Cutler-Hammer	1	0.95
Landing Gear Position Indicator	50-320214-1	1	
Heating and Ventilation			
Heater Blower Assembly	50-55098-1	1	10.0
Heater Fuel Solenoid Valve	12257-24	2	0.5
Heater Fuel Transfer Pump	476284	1	0.25
Heater Ignition Unit	A55A00	1	1.2
Pilot Tube Heater	782-2	1	3.33
Stall Warning Switch Heater	Kollsman Instrument 168-2	1	1.6
	Safe Flight		

Table 1-4. Electrical power loading chart (Sheet 6 of 8)

EQUIPMENT	PART DESCRIPTION	NO. OF UNITS PER AIR CRAFT	AMPERES PER UNIT
Engine Controls			
Starter Motor	756-56B	2	80.0
Starter Relay	6041H189 Cutler-Hammer	2	0.34
Lighting			
Rotating Beacon (Stabilizer)	50-364224-19	1	
Tail Navigation Lamp	MS25219-1	1	0.8
Wing Navigation Lamp, RH	B6345-2-24	1	
Wing Navigation Lamp, LH	7955-1-24	1	0.75
Landing Lamp	MS25241-4523	2	
Passing and Taxi Lamp	MS25243R4505	1	1.95
Compass Lamp	MS25237-327	1	0.04
Instrument Bolt Lamp	334 General Electric	43	0.04
Circuit Breaker Placard Lamp	MS25237-327	12	0.04
Map Lamp	AN3122-1524	1	0.75
Cabin Red Lamp	MS35478-307	2	0.65
Edge Lighted Panel Lamp	MS35478-327	39	0.65
Tab Position Indicator Lamp	MS25231-R313	2	0.04
Landing Gear Position Lamp	MS25237-327	3	0.04
Nose Baggage Compartment Lamp	305	1	0.3
Rear Baggage Compartment Lamp	305	1	0.3
Utility Lamp	MS25309-7512	1	0.04
Overhead Reading Lamp	MS25233-303	2	0.34
Cabin Step Lamp	MS25238-301	1	0.19
Outside Step Lamp	MS25235-311	1	1.5
Indicator Lamp	MS25237-327	5	0.04
Miscellaneous			
Cigarette Lighter	LPA-27630	3	1.5
Clock	AN5743T1A	1	
Landing Gear Warning Horn	MS25222-1	1	
DC Power			
Battery Charging	R33 Reading	2	
Battery Relay	6041H187 Cutlet-Hammer	2	0.72
Reverse Current Relay	AN3025-100	2	1.9
Inverter	1-101A-115S-7 Eicor	2	9.2
Radio and Navigation			
Marker Beacon	AN/ARN-12	1	1.5
Glide Slope	AN/ARA-54	1	1.1
Directional Gyro Indicator	653894-2B	1	0.67
Inverter	PU544A	1	45.00
IFF System	AN/APX 72	1	2.80
UHF Command Radio System	AN/ARC 51BX	1	12.25
FM Liaison Radio System	AN/ARC 54	1	7.40
Intercommunication System	C-1611 ()/AIC	2	0.20
TACAN Navigation System	AN/ARN-52 (V)	1	2.20
Speech Security System	KY-28	1	4.00
RMI Converter	CV - 1275 ()/ARN	1	0.06
VHF Radio System	AN/ARC-134	1	7.50
HF Command Radio System	AN/ARC-102	1	35.00

Table 1-4. Electrical power loading chart (Sheet 7 of 8)

EQUIPMENT	PART DESCRIPTION	NO. OF UNITS	
		PER AIRCRAFT	AMPERES PER UNIT
RU-8D			
Flight Controls			
Wing Flap Motor	50-364090-608	1	3.5
Anti-Icing			
Prop Anti-Ice Pump	AN6100-1	1	1.20
De-Ice Timer	42E06-9A	1	0.76
Engine Instruments			
Oil Temp Indicator	MS28043-1	2	0.1
Cyl Hd. Temp Indicator	202-2F1F-1A	1	0.1
Carburetor Air Temp Ind.	22-297-06	1	0.1
Flight Instruments			
Turn & Slip Ind.	MS28024-3	1	0.15
Landing Gear			
Landing Gear Retract Mtr.	50-810200-610	1	42.50
Landing Gear Control Relay	6046H39A	1	0.95
Heating & Ventilation			
Heater Blower	50-55098-1	1	10.00
Heater Fuel Solenoid Valve	12257-24	2	0.50
Heater Fuel Transfer Pump	476284	1	0.25
Heater Ignition Unit	A55A00	1	1.20
Pitot Tube Heater	782-2	1	3.33
Stall Warning SW Heater	168-2	1	1.60
Engine Controls			
Starter Motor	756-56B	2	80.00
Starter Relay	6041H189	2	0.34
Lighting			
Rotating Beacon Lamp	MS25219-1	1	0.80
Wing Tip Lamp	7955-1-24	2	0.75
Landing Lamp	MS25241-4553	2	8.93
Passing and Taxi Lamp	MS25243R4505	1	1.95
Compass Lamp	MS25237-327	1	0.04
Instrument Bolt Lamp	334	43	0.04
Ckt Bkr Placard Lamp	MS25237-327	12	0.04
Map Lamp	AN3122-1534	1	0.75
Cabin Red Lamp	MS35478-307	2	0.65
Edge Lighted Pnl Lamp	MS35478-327	39	0.65
Tab Position Ind Lamp	MS25231R313	2	0.04
Landing Gear Position Lamp	MS25237-327	3	0.04
Nose Compartment Lamp	305	1	0.30
Utility Lamp	B4745-2	2	0.67
Indicator Lamp	MS 25237-327	5	0.04

Table 1-4. Electrical power loading chart (Sheet 8 of 8)

EQUIPMENT	PART DESCRIPTION	NO. OF UNITS	
		PER AIRCRAFT	AMPERES PER UNIT
DC Power			
Battery Relay	6041H187	2	0.72
Reverse Current Relay	AN3025-100	2	1.90
Inverter	1-101A-115S-7	2	9.20
Inverter	1-101A-115D-7	2	9.20
Inverter	PU-544/A	2	45.00
Radio & Navigation			
ADF	AN/ARN-59	2	2.80
Glideslope	R844/ARN-58	1	1.20
Omni	AN/ARN-30()	1	2.50
Emer VHF Transmitter	T-366/ARC	1	1.00
UHF Command Radio	AN/ARC-51BX	1	12.25
VHF-FM Liaison Radio	AN/ARC-54	1	7.40
Intercom Set	C1611/AIC	3	0.20
Doppler Navigation	AN/ASN-64	1	4.34
Secure Speech	KY-28	1	1.50
RMI Converter	CV-1275/ARN	1	0.06
HF Command Radio	AN/ARC-102	1	35.00
IFF Transponder	AN/APX-72	1	2.80
Mission System	AN/ARD-15	1	10.00
Mission Receiver	R-1433	2	4.5
Radar Beacon	AN/UPN-25	1	1.00

NOTE

To prevent distortion of plastic enclosures in hot climates, doors and windows of aircraft should be opened slightly to permit air circulation through cabin when parked in direct rays of sun.

preparation and use of Log Book Forms are outlined in TM 38-750 (Army Equipment Record Procedures) and TM 55-405-9 (Army Aviation Maintenance Engineering Manual, Weight and Balance).

1-65. MAINTENANCE FORMS.

1-66. Forms required in the performance of the prescribed maintenance operation of the aircraft are contained in the aircraft Log Book. Assignment of responsibilities and instructions for

1-67. SUPPLEMENTARY DATA ON BEARING LUBRICATION.

1-68. Bearings which have been removed from components because inspection for condition indicates a need for cleaning will be cleaned in a manner indicated by whether the bearings are oil-or grease-lubricated. Refer to TM 55-1500-204-25/1 for bearing maintenance.

SECTION II AIRCRAFT GENERAL

1-69. GENERAL DESCRIPTION.

1-70. As there are four separate configurations of the Army U-8 series aircraft incorporated within this technical manual, there will be major and minor differences in maintenance functions among the different configurations. The four series configurations are the U-8D, U-8G, RU-8D, and U-8F. Major differences will be indicated by the applicable aircraft model designator, in parentheses, immediately following paragraph headings and figure and table titles. When no model designator symbol appears, the subject material applies to all models of the U-8 series aircraft. When only one designator symbol appears following a paragraph heading or figure or table title, the information is applicable only to that specific model aircraft.

1-71. DESCRIPTION. (U-8D)

1-72. The U-8D is an all-metal, twin-engine, low-wing monoplane equipped with a retractable tricycle landing gear. (See figure 1-1.) The semimonocoque-designed aircraft has a gross weight of 7300 pounds. It is primarily intended as a personnel transport, but can be adapted for light cargo, ambulance, photographic, multi-engine training, and other missions. The cabin is arranged with two three-placed seats, the pilot's station being the front left seat. A throwover control column and dual rudder pedals also permit the airplane to be flown from the front center seat (copilot's station). The U-8D is equipped with an electrically operated step which aids in ascent and descent to and from the cabin.

NOTE

Aircraft modified for instrument flight training have a dual-tee type control column with two control wheels instead of the conventional throwover control arm.

The aircraft is powered by two Lycoming Model O-480-1, horizontally opposed, six-cylinder, air-cooled engines. The supercharged engines utilize augmentor tube exhaust systems for improved cooling and pressure-type carburetors. The aircraft is equipped with two Hartzell all-metal, three-bladed propellers. The full-feathering, constant-speed propellers are hydraulically controlled. U-8D series aircraft are

equipped with various combinations of communications and navigation equipment. The equipment installed is dependent upon the theater of operation and intended purpose of the aircraft. Chapter 14 covers the various avionics configurations.

1-73. DESCRIPTION. (U-8G)

1-74. The U-8G is an all-metal, twin-engine, low-wing monoplane equipped with a retractable tricycle landing gear. (See figure 1-2.) The semimonocoque design aircraft has a gross weight of 7350 pounds. It is primarily intended as a personnel transport, but can be adapted for light cargo, ambulance, photographic, multi-engine training, and other missions. The cabin compartment provides seating for the pilot, copilot, and four passengers. A dual control column and dual rudder pedals permit the aircraft to be flown by either the pilot or copilot. The aircraft is powered by two Lycoming Model O-480-1, horizontally opposed, six-cylinder air-cooled engines. The supercharged engines utilize augmentor tube exhaust systems for improved cooling and pressure-type carburetors. The aircraft is equipped with two Hartzell all-metal, three-bladed propellers. The full-feathering, constant-speed propellers are hydraulically controlled. U-8G series aircraft are equipped with various combinations of communications and navigation equipment. The equipment installed is dependent upon the theater of operation and intended purpose of the aircraft. Chapter 14 covers the various avionics configurations.

1-75. DESCRIPTION. (RU-8D)

1-76. The RU-8D is an all-metal, twin-engine, low-wing monoplane equipped with a retractable tricycle landing gear (see figure 1-3). The semimonocoque designed aircraft has a gross weight of 7350 pounds. It is primarily intended as a precision navigational aircraft. The cabin compartment is arranged with one three-placed seat and a single passenger seat, with the pilot's station being the left front seat. A throwover control column and dual rudder pedals also permit the airplane to be flown from the front center seat (copilot's station). The aircraft is powered by two Lycoming Model O-480-1,

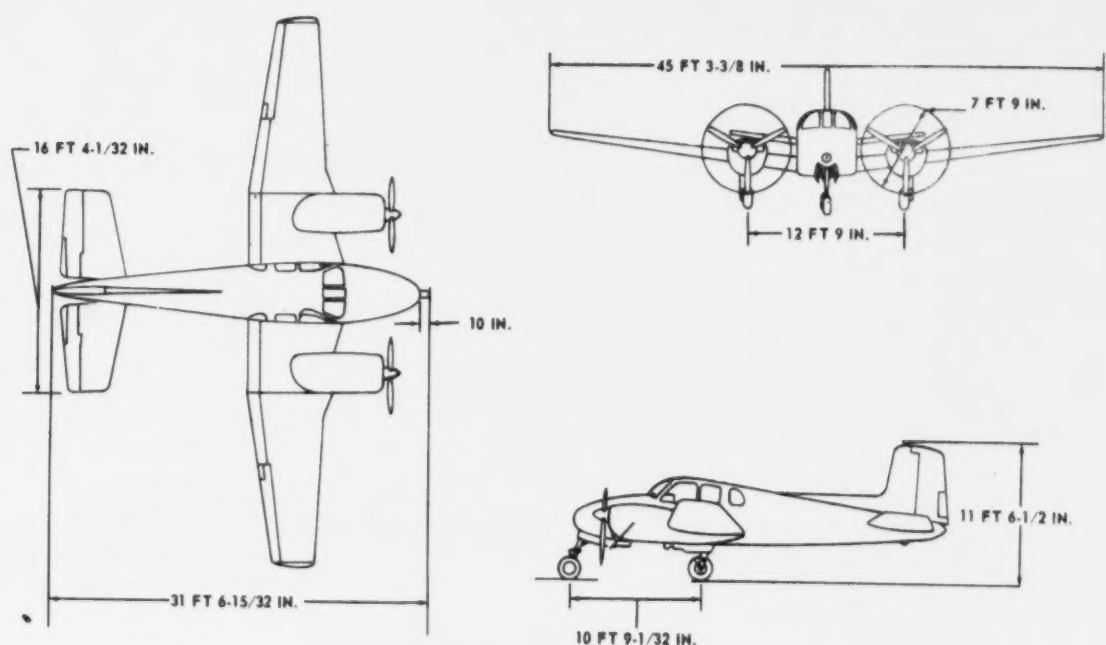


Figure 1-1. Aircraft dimensions (U-8D)

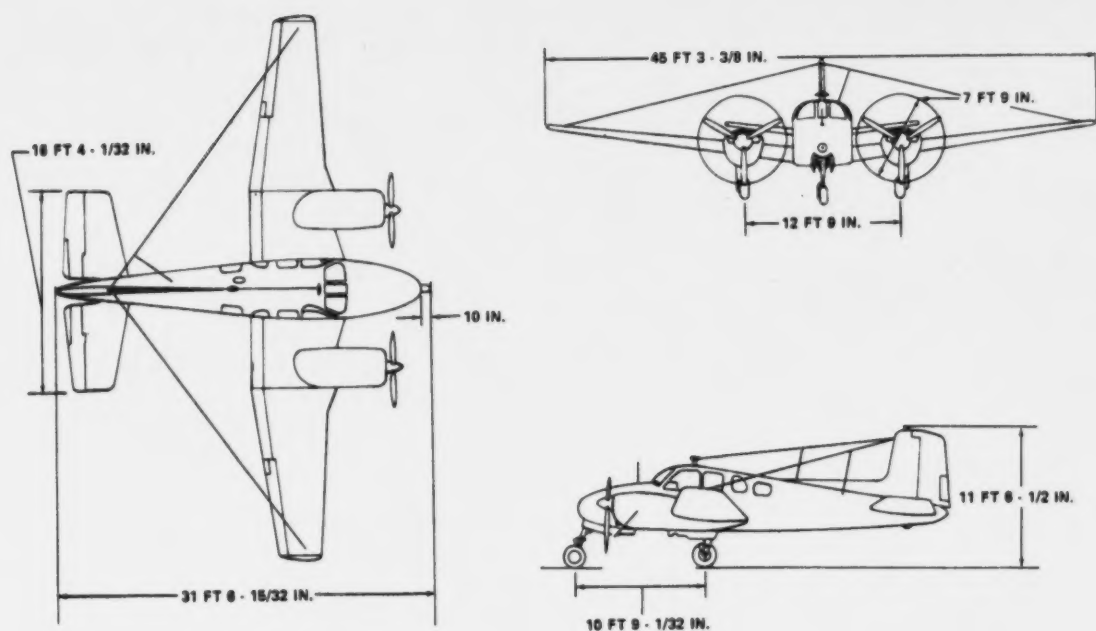


Figure 1-2. Aircraft dimensions (U-8G)

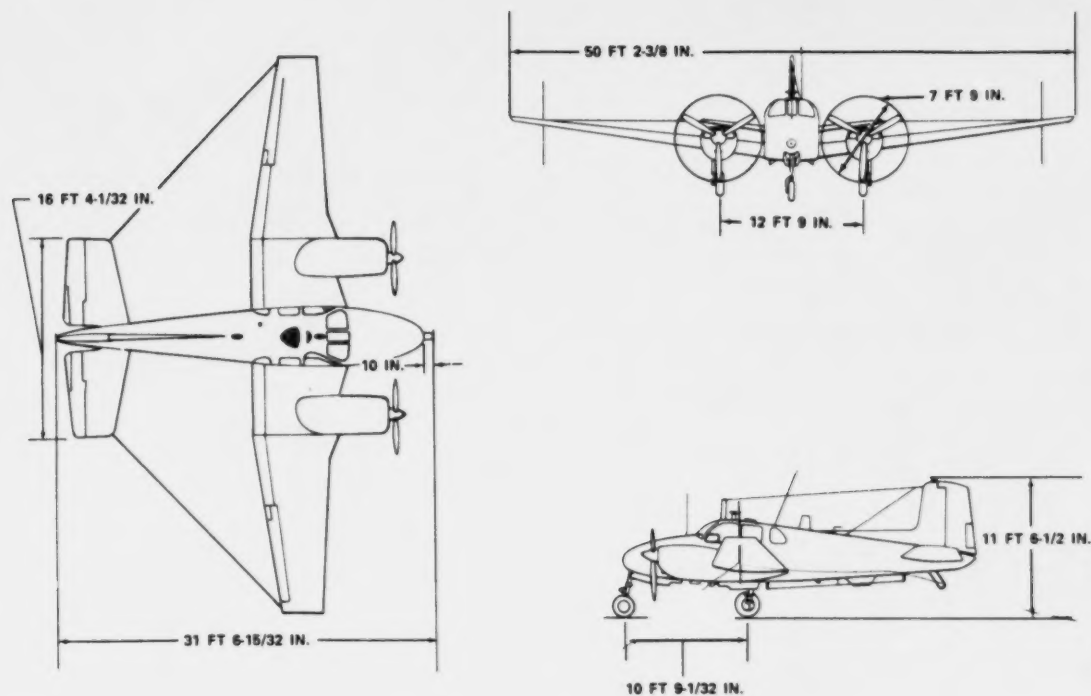


Figure 1-3. Aircraft dimensions (RU-8D)

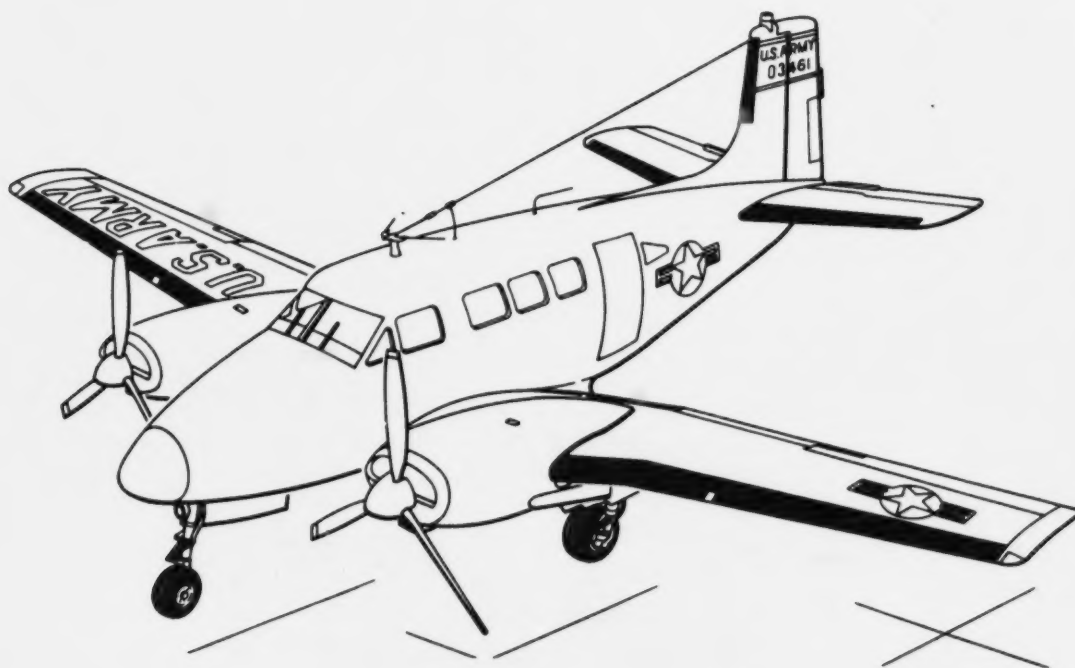
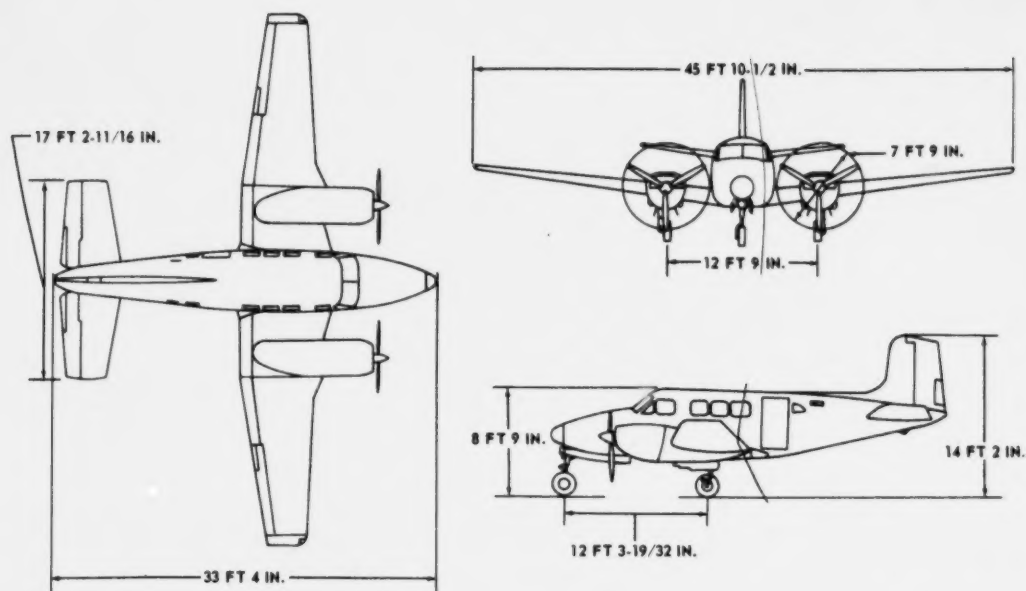


Figure 1-4. Aircraft dimensions (U-8F)

Table 1-5. Aircraft dimensions (sheet 1 of 2)

	U-8D, U-8G	RU-8D	U-8F
GENERAL			
Span	45 ft 3-3/8 in.	50 ft 3-5/16 in.	45 ft 10-1/2 in.
Length (Overall)	31 ft 6-15/32 in.	31 ft 6-15/32 in.	33 ft 4 in.
Height	11 ft 6-1/2 in.	11 ft 6-1/2 in.	14 ft 2 in.
Propeller Ground Clearance	18.5 in.	18-3/32 in.	10.6 in.
Design Gross Weight	7000 lb	7350 lb	7700 lb
Maximum Alternate Gross Weight	7000 lb	7350 lb	7350 lb
WINGS			
Type	Low	Low	Low
Airfoil Section (Theoretical at Centerline of Fuselage) Modified NACA	23014.10	23014.10	23014.10
(At Root of Outer Panel) Modified NACA	23016.22	23016.22	23016.22
(Theoretical Tip) Modified NACA	23012	23012	23012
Chord at Root (Theoretical at Centerline of Fuselage)	84.611	84.611	84.611
Chord near Tip (Theoretical Tip)	42 in.	42 in.	42 in.
Mean Aerodynamic Chord	78.152	75.88	77.86
Incidence at Root	5.8 deg	5.8 deg	4.8 deg
Incidence at Theoretical Tip	1.0 deg	1.0 deg	0 deg
Dihedral	7 deg	7 deg	7 deg
Sweep Back (Outer Panel at 25 per cent Chord)	0 deg	0 deg	0 deg
Aspect Ratio	7.51	8.6	7.51
STABILIZER			
Span	16 ft 4-1/32 in.	16 ft 4-5/16 in.	17 ft
Maximum Chord (Centerline of Fuselage)	66 in.	66 in.	66.20 in.
Incidence	2 deg	2 deg	1 deg
Dihedral	7 deg	7 deg	7 deg
Sweep Back of Leading Edge	10 deg 13 min	10 deg 13 min	10 deg 13 min
FUSELAGE			
Width (Maximum)	58.5 in.	58.5 in.	61.25 in.
Height (Maximum)	64.5 in.	64.5 in.	70 in.
Length (With or Without Engine Mounts)	31 ft 6 in.	31 ft 6 in.	33 ft 2-1/2 in.
Total Cubic Feet Storage Space Available	41 cu ft	41 cu ft	30 cu ft
Door Dimensions (Forward Baggage)	26.5 by 26.75 in.	26.5 by 26.75 in.	28 by 26.5 in.
Door Dimensions (Rear Baggage)	21.5 by 19.75 in.	21.5 by 19.75 in.	-----

Table 1-5. Aircraft dimensions (sheet 2 of 2)

	U-8D, U-8G	RU-8D	U-8F
AREAS			
Wings (Total)	277.06 sq ft	293.94 sq ft	279.74 sq ft
Wings (With Flaps Extended)	263.17 sq ft	278.43 sq ft	265.85 sq ft
Ailerons (Total) Including Tab	13.89 sq ft	15.51 sq ft	13.89 sq ft
Aileron Tab	2 sq ft	2 sq ft	2 sq ft
Flaps (Total)	37.80 sq ft	37.80 sq ft	29.30 sq ft
Stabilizers (Including Elevators)	64.74 sq ft	64.74 sq ft	65.12 sq ft
Elevators (Including Tabs)	17.49 sq ft	17.49 sq ft	17.87 sq ft
Elevator Trim Tabs (Total)	2.75 sq ft	2.75 sq ft	3.13 sq ft
Fin	14.25 sq ft	14.25 sq ft	14.25 sq ft
Rudder (Including Tabs)	12.77 sq ft	12.77 sq ft	12.77 sq ft
Rudder Tab	1.55 sq ft	1.55 sq ft	1.55 sq ft

horizontally opposed, six-cylinder, air-cooled engines. The supercharged engines utilize augmentor tube exhaust systems for improved cooling and pressure-type carburetors. The aircraft is equipped with two Hartzell all-metal, three-bladed propellers. The full-feathering, constant-speed propellers are hydraulically controlled. RU-8D series aircraft are equipped with various combinations of communications and navigation equipment. The equipment installed is dependent upon the theater of operation and intended purpose of the aircraft. Chapter 14 covers the various avionic configurations.

1-77. DESCRIPTION. (U-8F)

1-78. The U-8F is an all-metal, twin-engine, low-wing monoplane equipped with a retractable tricycle landing gear. (See figure 1-4.) While the main landing gears protrude slightly from the nacelles when retracted, the nose gear is designed for full retraction as a means of increasing airspeed. The aircraft is powered by two Lycoming O-480-3 engines equipped with a Simmons SU series fuel injection system. The six-cylinder, horizontally opposed, supercharged power plants utilize a two-stage augmentor exhaust system to provide added thrust and adequate cooling during all ground and flight altitudes. Each engine has a rating of 320 hp at 3200 rpm at sea level and a 340 hp takeoff rating at 3400 rpm. The aircraft is equipped with two Hartzell all-metal, full-feathering, constant-speed, hydraulically controlled, three-bladed propellers. The cabin compartment is subdivided into two separate compartments, the pilot's compartment, which has seating arrangements for the pilot and copilot, and the passenger's compartment, which has standard seating provisions for four passengers. Although the aircraft was designed as a personnel transport, the passenger's seats are readily removable for adaption of the aircraft for light cargo, photographic, ambulance, or multi-engine training missions. The U-8F has a design gross weight of 7700 pounds for takeoff and 7350 pounds for landing.

1-79. AIRCRAFT DIMENSIONS.

1-80. The principle aircraft dimensions are shown in figures 1-1, 1-2, 1-3, and 1-4 and listed in table 1-5.

1-81. STATION LOCATIONS.

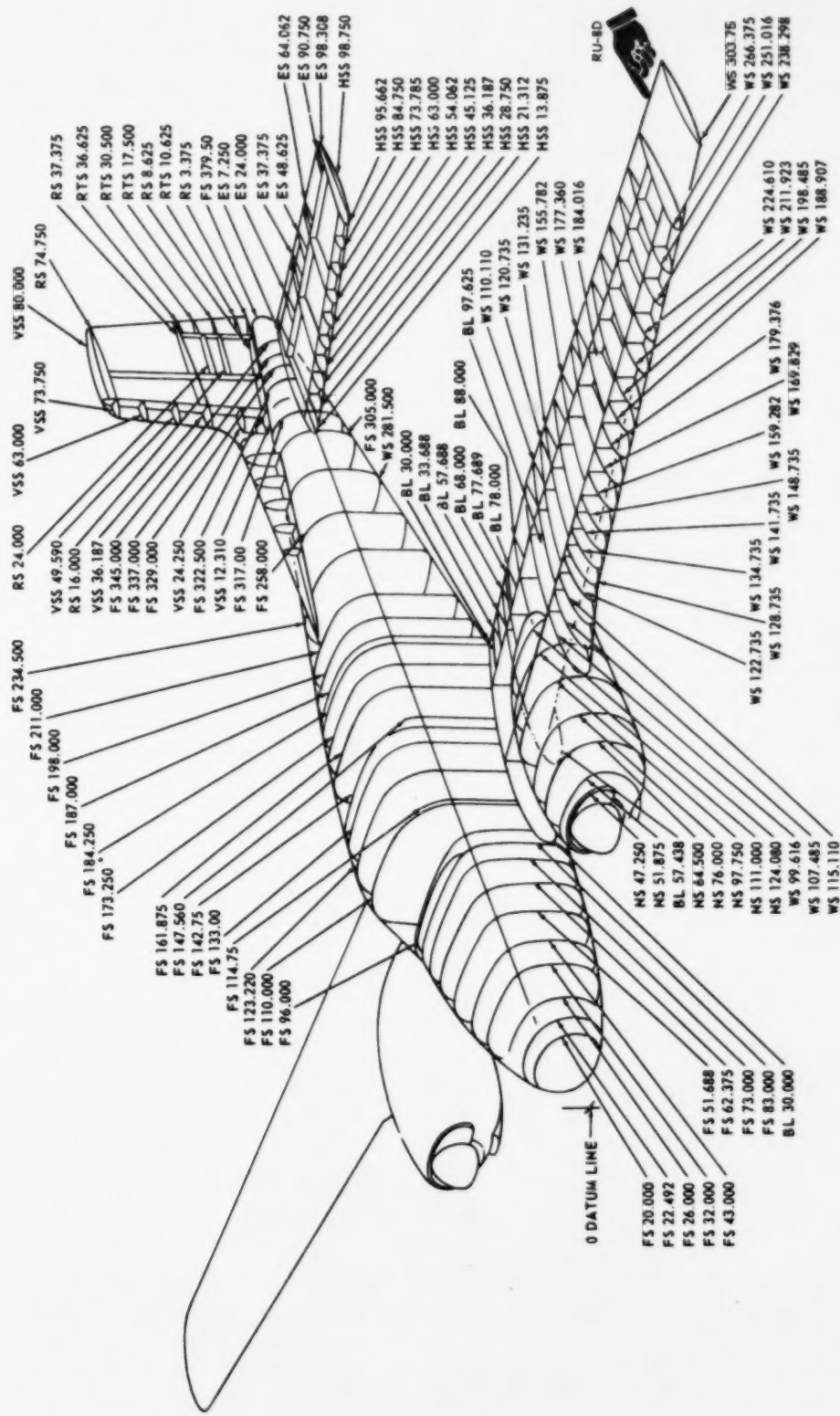
1-82. In order to facilitate the location of various components of the aircraft which require maintenance and servicing, a method utilizing station, buttock line, and waterline designations is frequently employed in this manual. (See figure 1-5 and 1-6.) Stations, buttock lines, and waterlines are reference points measured by inches in the vertical or horizontal direction from a given reference line which has been arbitrarily assigned to a specific series or model of aircraft. Either buttock line or station (which designates vertical planes), when used in conjunction with the waterline (which designates horizontal plane), will pin point any desired location on the aircraft. On the U-8 aircraft, locations along the length of the fuselage are indicated by fuselage stations (FS). A fuselage station is the distance in inches running aft along the fuselage from an imaginary reference line called the datum line. The datum line is located at a point 12 inches in front of the foremost point of the nose cone on the U-8D, U-8G, and RU-8D. Wing stations (WS) are used to designate points outboard along the wing. A wing station is the distance in inches measured outboard from the imaginary point at the centerline of the aircraft where the wing reference planes intersect. The distance outboard from the centerline of the aircraft is indicated by buttock lines (BL) which, on the U-8 aircraft, also run through the center section of the wing.

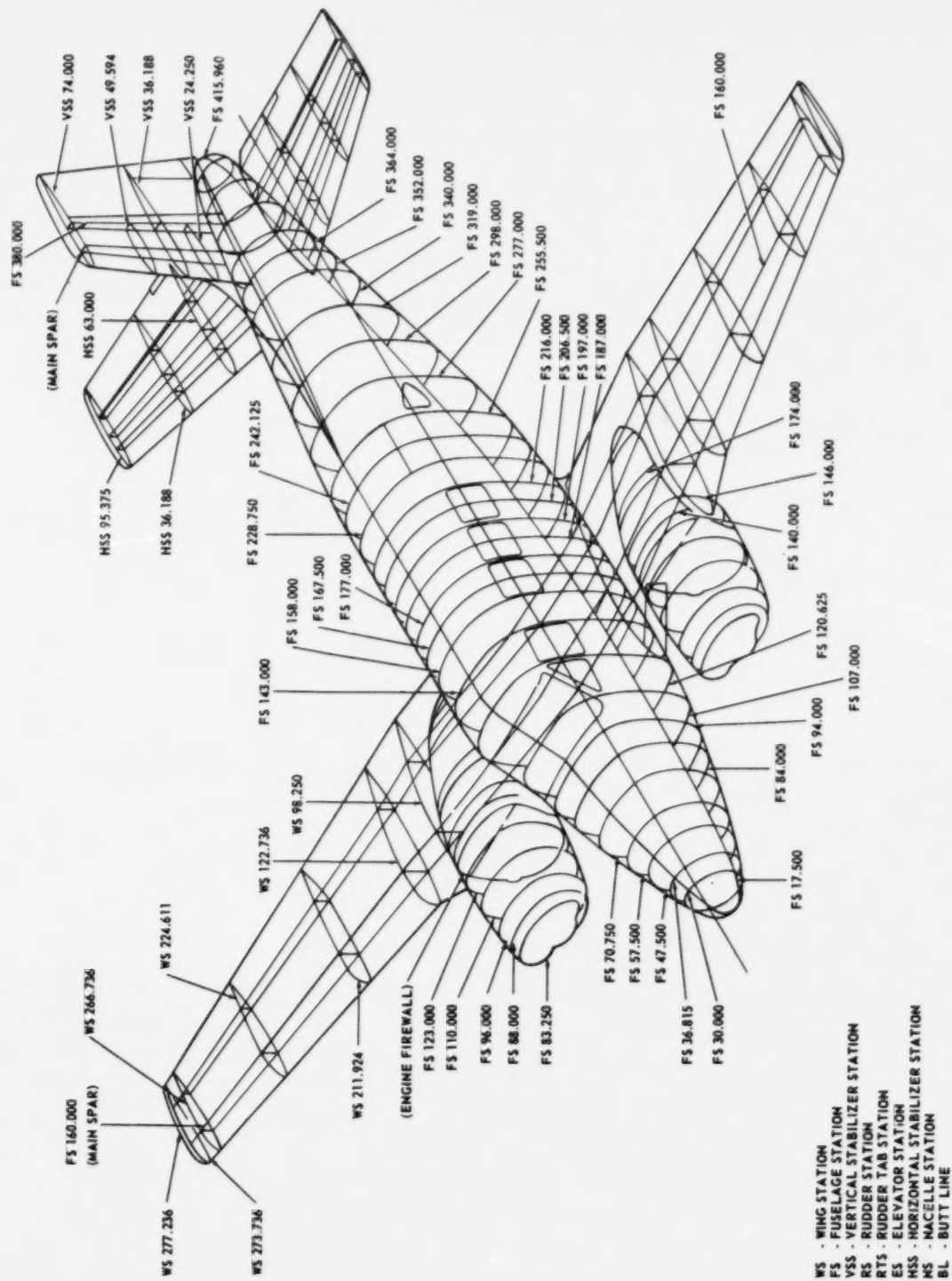
1-83. ACCESS AND INSPECTION PROVISIONS.

1-84. The access and inspection provisions for the aircraft are shown in figures 1-7 through 1-11.

CAUTION

Be careful not to damage access doors or plates and their attached catches during removal and installation. Access plates, damaged to the extent that they will not properly fit, produce drag that has an adverse affect upon the behavior of the aircraft during flight. The failure to properly install access covers will expose vulnerable components of the aircraft to dangerous wind buffeting. If carelessly installed, the screws or catches which hold the access doors in place may vibrate loose. Be sure all access doors or plates of a structural nature are properly installed, as their loss or absence during flight could produce damage to the aircraft.





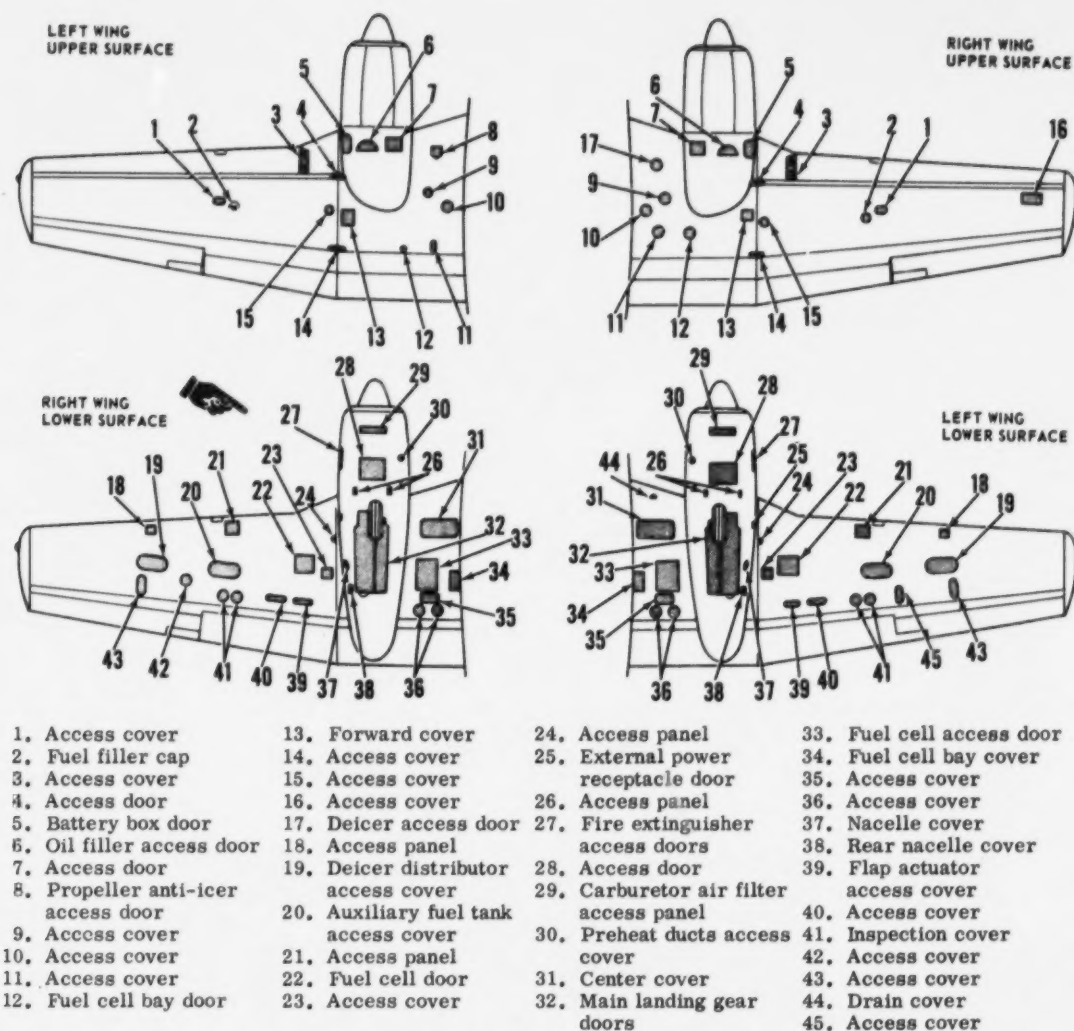


Figure 1-7. Wing access and inspection provisions (U-8D, U-8G, and RU-8D)

1-85. GROUND HANDLING.

1-86. Ground handling covers all the essential information concerning movement and handling of the aircraft while on the ground. This consists of hoisting, jacking, leveling, mooring, installation of protection covers, parking, moving aircraft on ground, anti-icing and de-icing, and application of external power. The following paragraphs give, in detail, the instructions and precautions necessary to accomplish ground handling functions.

1-87. GENERAL GROUND HANDLING PROCEDURE.

1-88. Accidents resulting in injury to personnel and damage to equipment can be avoided or minimized by close observance of existing safety standards and recognized ground handling procedures. Carelessness or insufficient knowledge of the aircraft or equipment being handled can be fatal. The applicable technical manuals and pertinent directives should be studied for familiarization with the aircraft, its components, and the ground handling procedures applicable to it, before attempting to

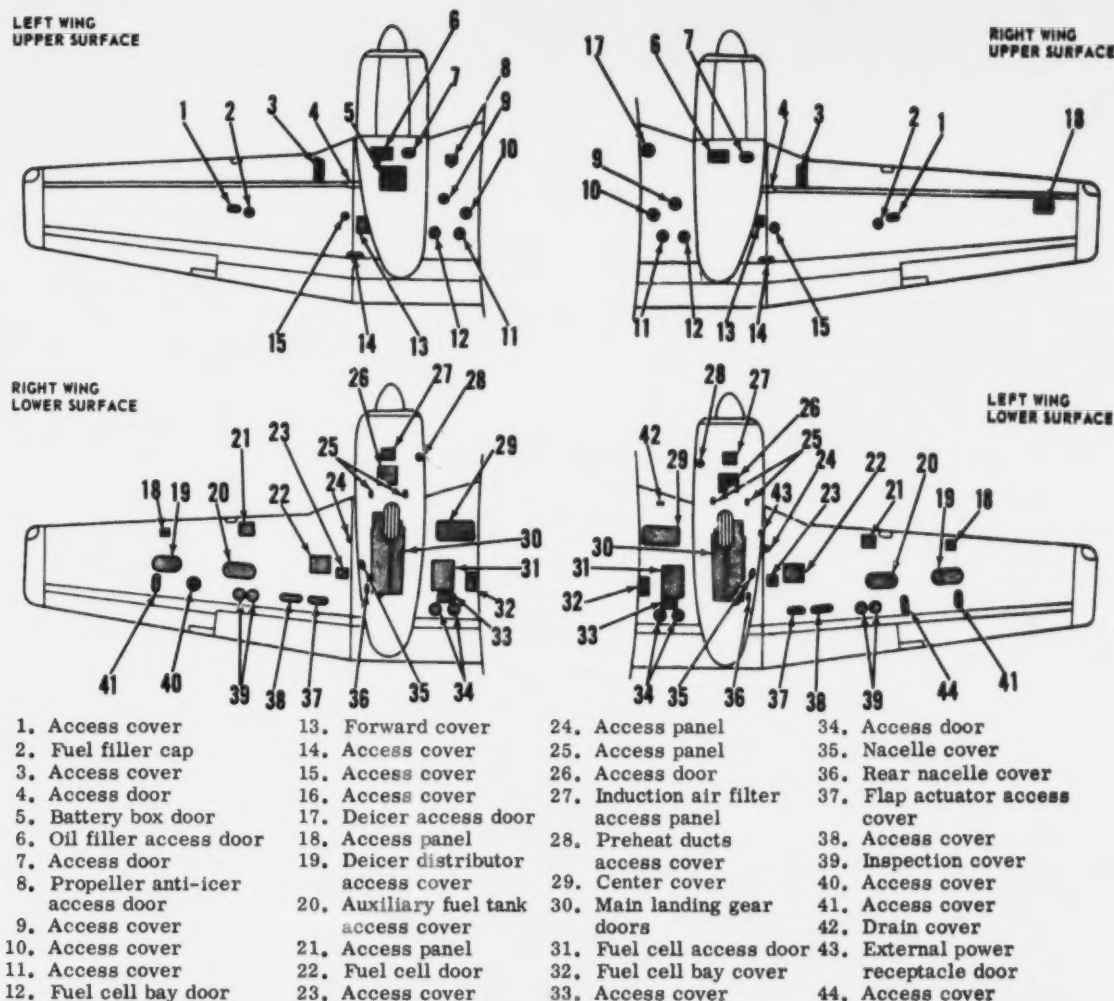


Figure 1-8. Wing access and inspection provisions (U-8F)

accomplish ground handling. The following general information should be observed while performing ground handling procedures:

a. Do not operate engines with control surfaces in the LOCKED position.

b. Do not attempt towing or taxiing of the aircraft with control surfaces in the LOCKED position. When high winds are present, do not unlock the control surfaces until prepared to properly operate them.

c. Do not operate engines while towing equipment is attached to the aircraft, nor while the aircraft is tied down.

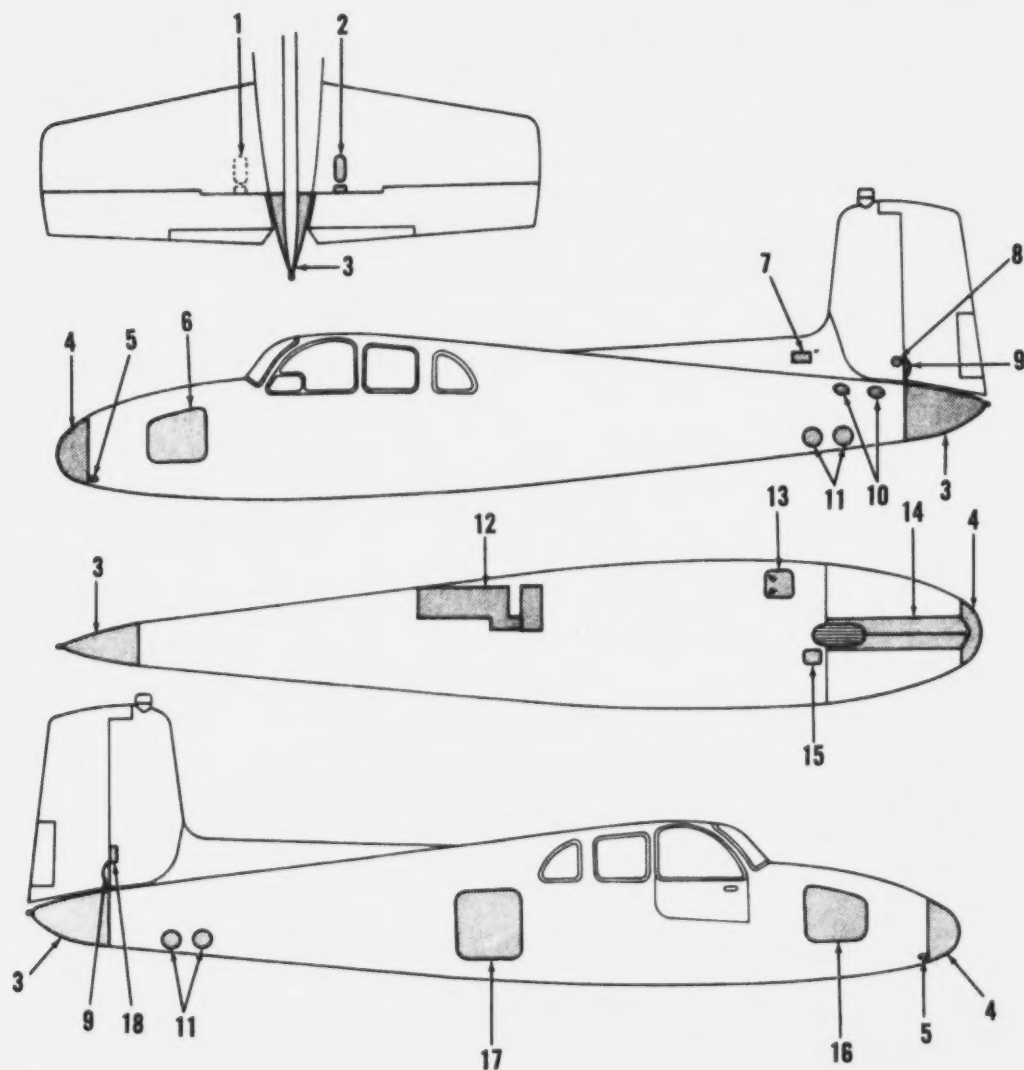
d. Check the nose wheel position. Unless it is in the fore and aft or straight ahead position,

avoid operating the engines at a high rpm.

e. Use only approved-type wheel chocks during engine warmup prior to taxiing.

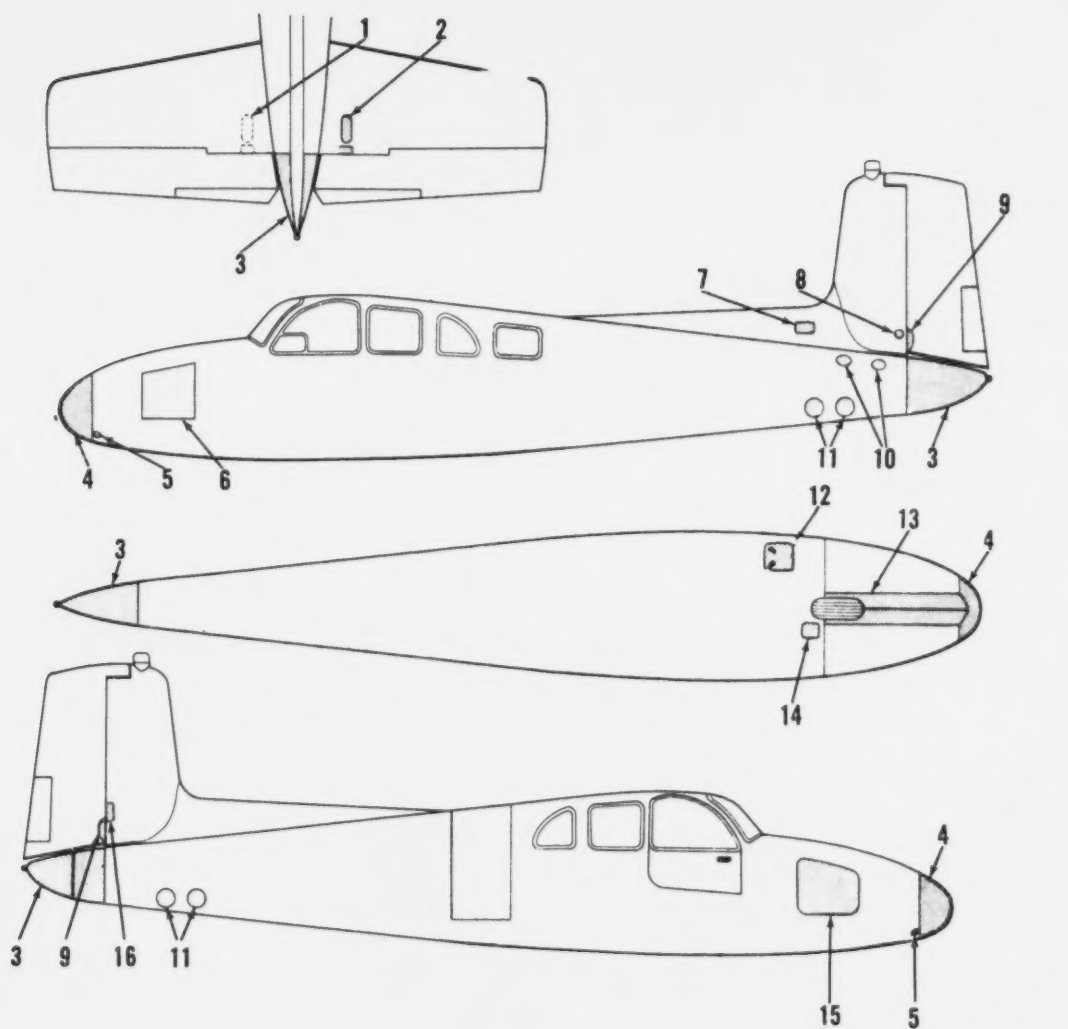
NOTE

Keep in mind that the holding force of a set of wheel chocks, even when properly placed in front of the main gear wheels, will not withstand the force exerted by an engine or engines at acceleration speeds. The aircraft will remain stationary under these circumstances, if brakes are applied.



- | | | | |
|----------------------------------|---|--------------------------------|--------------------------------------|
| 1. Inspection cover | 7. Dorsal fin door | 12. Fuselage step (U-8D) | 16. Forward baggage compartment door |
| 2. Inspection cover | 8. Patch plate | 13. Engine preheat access door | 17. Aft baggage compartment door |
| 3. Tail cone | 9. Inspection door | 14. Nose landing gear door | 18. Access door |
| 4. Nose cone | 10. Vertical and horizontal stabilizer access doors | 15. Access door | |
| 5. Access cover | 11. Fuselage access doors | | |
| 6. Forward equipment access door | | | |

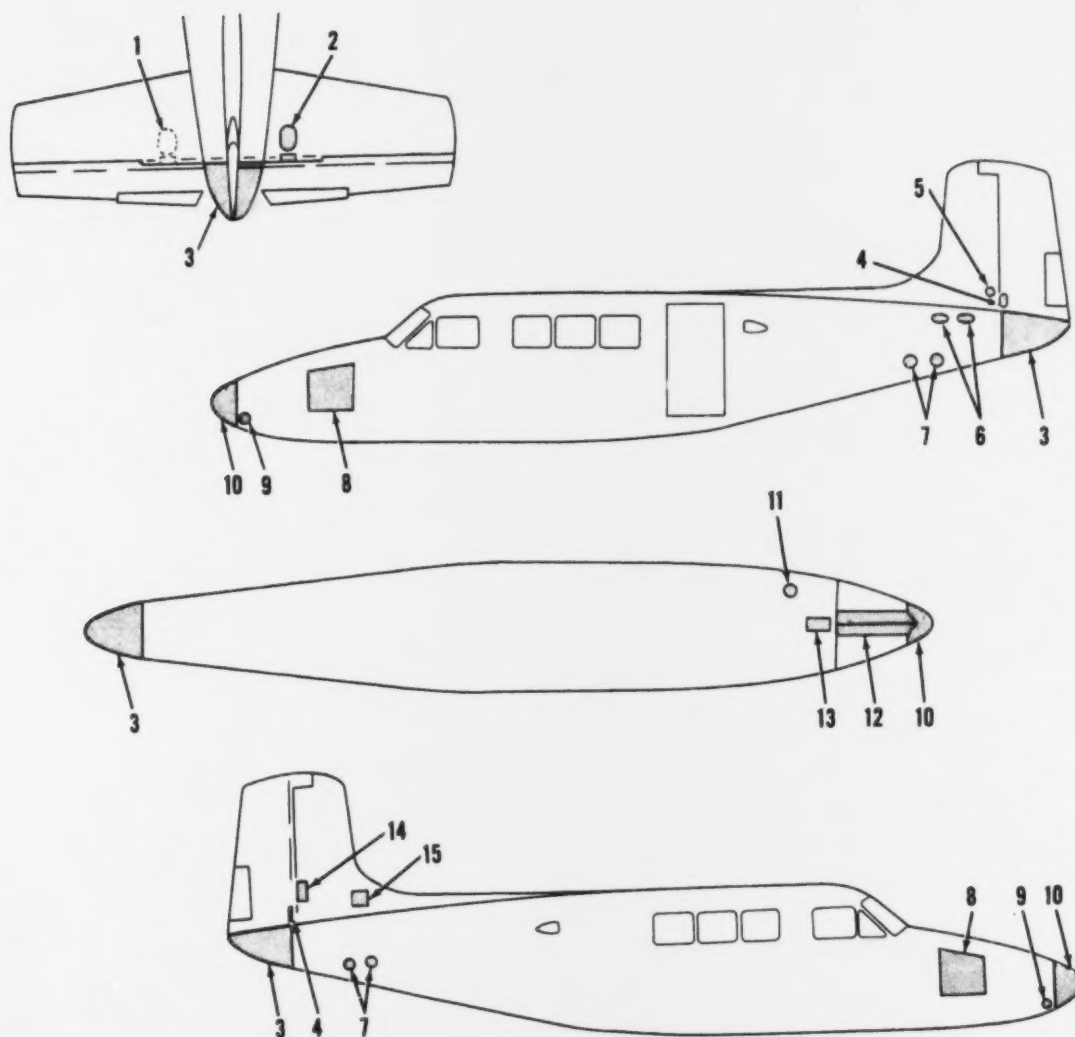
Figure 1-9. Fuselage access and inspection provisions (U-8D and RU-8D)



1. Inspection cover
2. Inspection cover
3. Tail cone
4. Nose cone
5. Access cover
6. Forward equipment access door
7. Dorsal fin door
8. Patch plate

9. Inspection
10. Vertical and horizontal stabilizer access doors
11. Fuselage access doors
12. Engine preheat access door
13. Nose landing gear door
14. Access door
15. Forward baggage compartment door
16. Access door

Figure 1-10. Fuselage access and inspection provisions (U-8G)



- | | | | |
|---------------------|--|--------------------------------|-----------------|
| 1. Inspection cover | 6. Vertical and horizontal stabilizer access doors | 9. Access cover | 13. Access door |
| 2. Inspection cover | 7. Fuselage access doors | 10. Radome | 14. Access door |
| 3. Tail cone | 8. Nose equipment compartment door | 11. Engine preheat access door | 15. Access door |
| 4. Inspection door | | 12. Nose landing gear door | |
| 5. Patch plate | | | |

Figure 1-11. Fuselage access and inspection provisions (U-8F)

f. Hold control surfaces in the NEUTRAL position when the engines are being operated at a high rpm.

g. When parking the aircraft, apply the parking brakes by depressing the pilot's brake pedals and pulling out the parking brake handle. It will not apply brake pressure. Pull on the handle just enough to move it through its full travel. To release the parking brakes, push in on the parking brake handle.

CAUTION

Do not set parking brakes when the brakes are hot as a result of undue use or during low temperatures. An accumulation of moisture may cause the brakes to freeze. When overheated, the brakes should be permitted to cool before being set.

1-89. GROUND HANDLING UNDER EXTREME WEATHER CONDITIONS.

1-90. Extreme weather conditions necessitate particular care in ground handling of the aircraft. In hot, dry, sandy, desert conditions, extra mooring precautions must be taken. Special attention must be devoted to finding firmly packed parking or towing areas. If such areas are not available, steel mats or an equivalent solid base must be provided for these purposes. In wet, swampy areas, care must be taken to avoid bogging down of the aircraft. Under cold, icy, arctic conditions, additional mooring is required, and added precautions must be taken to avoid skidding during towing operations. The particular problems to be encountered under adverse weather conditions and the special methods designed to avoid damage to the aircraft are covered in TM55-1500-204-25/1.

1-90A. RECOVERY.

1-90B. Aerial Recovery. Recover aircraft per FM 55-413.

WARNING

Use of U-8 hardpoints is strictly prohibited for aerial aircraft recovery operations.

1-90C. Water Recovery.

CAUTION

When lifting out of water, open doors and access plates. Lift aircraft slowly and allow water to drain as aircraft is being raised.

1-91. HOISTING.

1-92. The aircraft may be hoisted for maintenance or parts replacement by use of a three-cable sling attached to the hoisting lugs and eyebolt. (See figure 1-12.) A minimum overhead clearance of 12 feet 6 inches and a hoisting capacity of 3-1/2 tons are required for the U-8D, U-8G, and RU-8D aircraft. A minimum overhead clearance of 15 feet 2 inches and a hoisting capacity of 4 tons are required for the U-8F aircraft. Hoist the aircraft as follows:

CAUTION

When hoisting an aircraft with one or both engines removed, be sure to use a sling under the tail. (See figure 1-12.) The sling prevents the weight of the aircraft from shifting aft and causing damage to the tail section when the aircraft is hoisted. The tail mooring hole can be used to hold the sling in position.

- a. Remove plug in nose section top skin just aft of nose cone. Install hoisting adapter eyebolt through skin into fitting.
- b. Remove plugs in wing center section. Insert MS20074-08-15 bolts through sling hoisting lugs and screw them into center section fittings.
- c. Attach sling to three hoisting points described in steps a and b above.
- d. Remove all loose equipment and baggage from aircraft.
- e. Hoist aircraft smoothly, using extreme caution throughout entire operation.

CAUTION

Avoid sudden starts, stops, and drops while hoisting or lowering. If such occur, examine the bathtub fittings on both inboard and outboard wings to make sure they are undamaged and that rivets which secure them to center section and outer wing panels are sound. Avoid hoisting aircraft in high wind conditions.

1-93. JACKING.

1-94. All configurations of the aircraft are provided with three jacking positions, located as follows: two on the center section of the rear spar just inboard of the engine nacelles, and one near the aft end of the nose wheel well to the left of the fuselage centerline (see figure 1-13). Jack points are also provided on each main gear so the wheels may be raised individually with small hydraulic jacks for changing wheels, tires, or making minor brake repairs. Under snowy conditions, every precaution should be taken to remove all ice from the jack feet prior to jacking. To avoid the danger of slippage when it becomes necessary to jack the aircraft on ice-covered surfaces, drill and tap the jack feet, then install setscrews into these holes. Sharpen the setscrews and thrust securely into the ice before jacking.

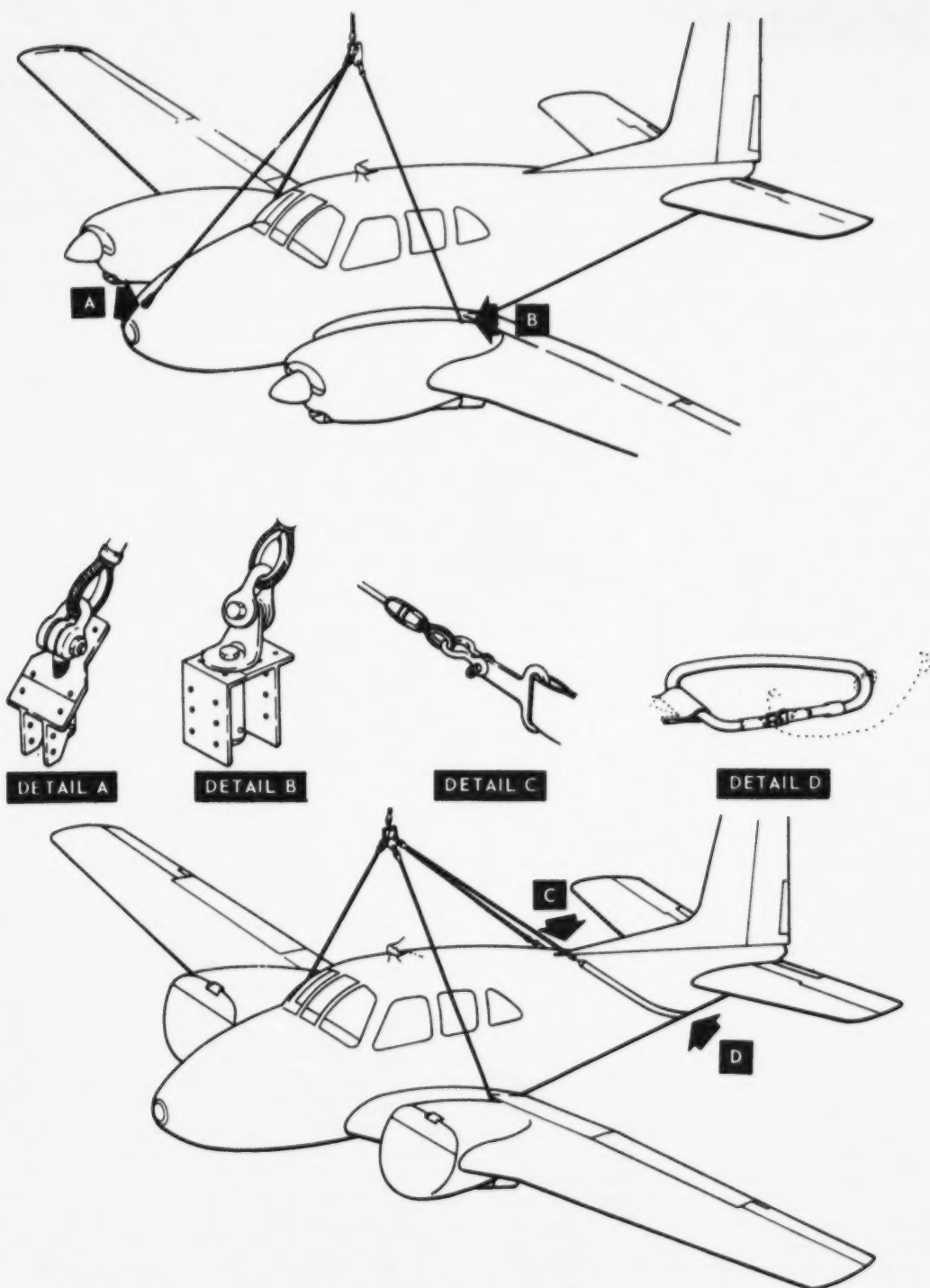


Figure 1-12. Hoisting the aircraft

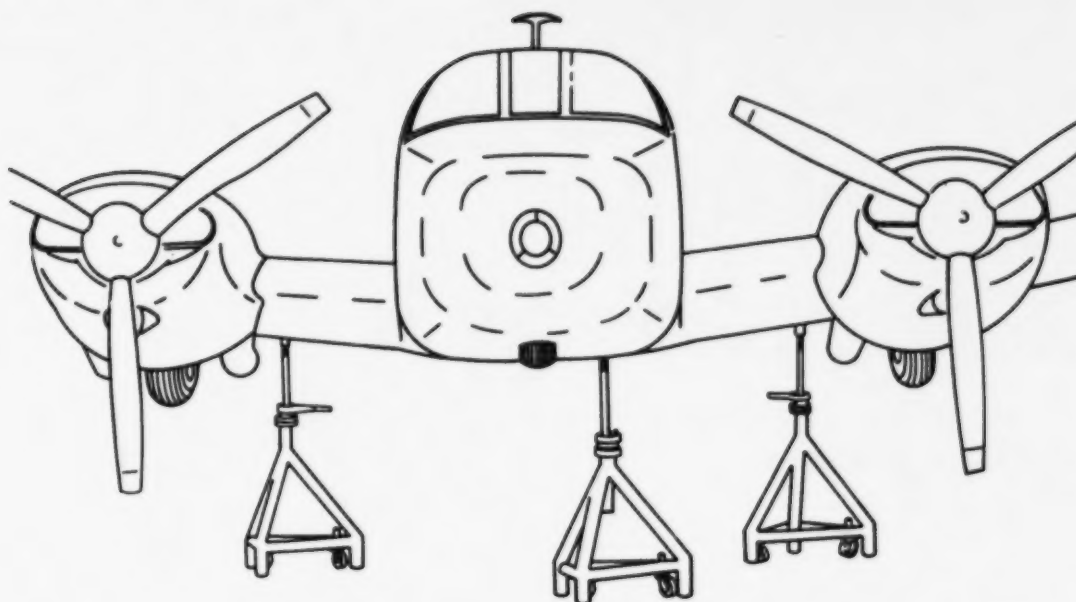


Figure 1-13. Jacking the aircraft

CAUTION

When jacking the aircraft, all three jacks must be raised simultaneously. Center each jack on its jacking pad to insure proper stability. With the aircraft on jacks, be sure the heater blower switch is placed in the OFF position prior to turning on the battery master switches. When lowering the aircraft, the shock struts may bind before reaching their normal compressed position. To avoid damage, such binds should be jarred loose and the aircraft lowered completely before removing the jacks.

1-95. LEVELING.

1-96. All configurations of U-8 aircraft are provided with a means for lateral and longitudinal leveling. Before attempting the leveling operation, the tires shall be properly inflated and the aircraft should be parked on a known level surface. The leveling operation is simplified by the tricycle gear installation, which maintains the aircraft in a nearly level position while on the ground. Lateral leveling is accomplished by placing a spirit level on

the aft baggage compartment floorboard and deflating the strut on the high side of the aircraft until the bubble is centered. Longitudinal leveling is accomplished by attaching a plumb bob and a 4-foot length of string to the upper screw, located just behind the aft baggage compartment opening on the U-8D, U-8G, and RU-8D (figure 1-14) and just forward of the cabin door on the U-8F configuration. Inflate or deflate the nose gear shock strut until the cord passes through the center of the lower screw.

NOTE

When installing or checking the accuracy of instruments which function properly only while in a level flight position, place the aircraft on jacks and adjust until the aircraft is accurately leveled in accordance with the procedures described above.

1-97. MOORING.

1-98. The aircraft is moored to ensure its immovability, protection, and security under various weather conditions. The following paragraphs give, in detail, the instructions for proper mooring of the aircraft.

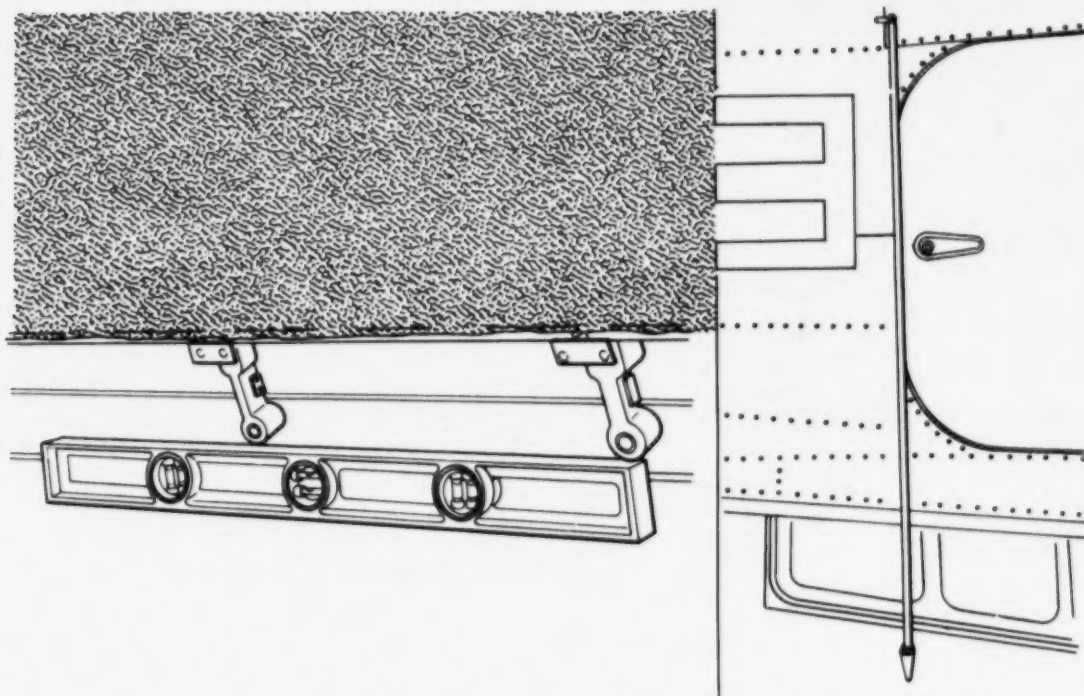


Figure 1-14. Leveling the aircraft

1-99. **MOORING PROVISIONS.** Mooring points (figure 1-15) are provided beneath the wing, nose, and tail and on each main landing gear. General mooring equipment and procedures necessary to moor the aircraft, in addition to the following paragraphs, will be given in TM 55-1500-204-25/1.

a. Use mooring cables of 1/4-inch aircraft cable and clamp (clip-wire rope), chain or rope 3/8-inch or over. Length of the cable or rope will be dependent upon existing circumstances. Allow sufficient slack in rope, chains, or cable to compensate for tightening action due to moisture absorption of rope or thermal contraction of cable or chain.

CAUTION

Do not use slip knots. Use square, bowline, or some other equally reliable anti-slip knot to ensure firm, safe anchoring.

b. One-piece wheel chocks or woodblocks may be used to chock the main landing gear wheels. They must be equipped with rope or wood cleats to retain them against the wheels.

NOTE

In ice or snow conditions, collapsible ice grip wheel chocks should be used. However, sandbags may be used if collapsible chocks are not available or if parking or mooring the aircraft on steel mats.

1-100. **MOORING PROCEDURES FOR HIGH WINDS.** a. If an aircraft is to remain securely moored during high velocity winds, it is necessary to use the proper size and type of wheel chock. (Refer to paragraph 1-99, step b.)

b. Since the factor of weight is significant in determining adequate mooring provisions, the approximate weight must be known if the aircraft is to be properly secured. The design gross weight of the U-8D is 7300 pounds. The gross weight of the U-8G and RU-8D is 7350 pounds. The design gross weight of the U-8F is 7700 pounds. It is also well to keep in mind the variation in aircraft weight due to the amount of cargo. During emergencies, knowledge of this information is very useful in selecting the aircraft that should be tied down first, as a heavy aircraft will better stand high winds than an empty aircraft.

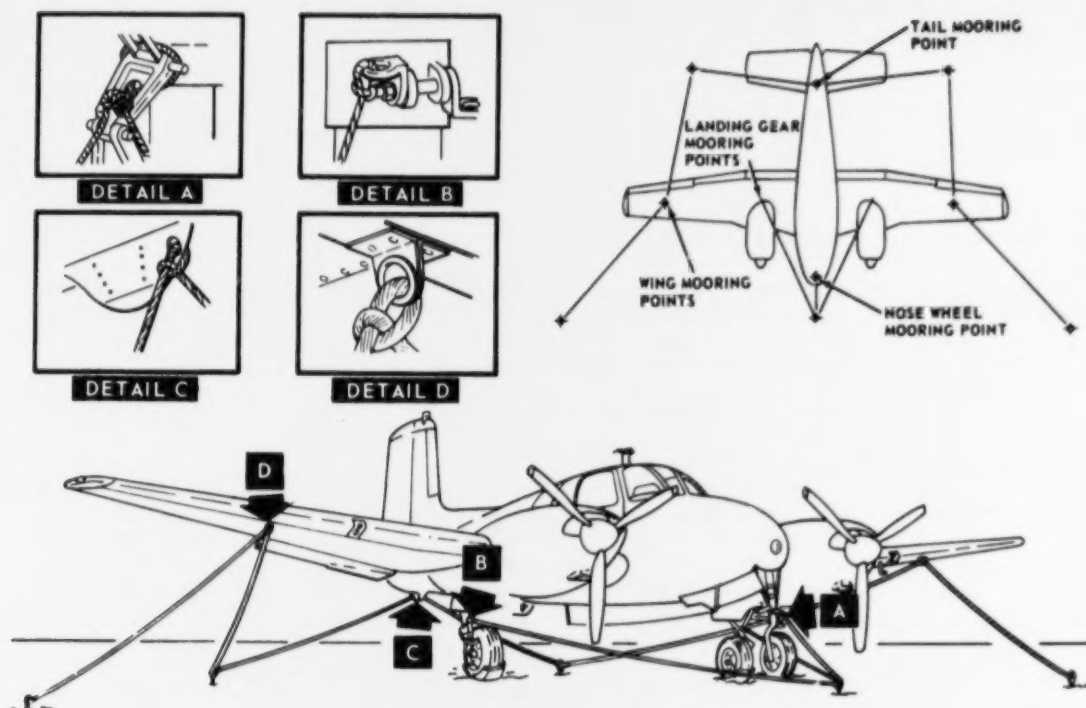


Figure 1-15. Mooring the aircraft

CAUTION

Structural damage can occur from high velocity winds; therefore, if at all possible, the aircraft should be moved to a safe weather area when a tornado, hurricane, typhoon, or winds above 75 knots are expected. When an aircraft has been subjected to high wind velocities, control surfaces, hinge points, attachment fittings, etc. will be inspected for cracks, popped rivets, and other damage. Bolts and rivets will be inspected for evidence of shearing or looseness. Repairs will be made according to applicable technical manuals before the aircraft is declared flight-worthy. Refer to Maintenance Allocation Chart for authorization.

c. After aircraft is properly located, place nose wheel in fore and aft position. Head aircraft into the wind, or as nearly so as is possible within limits determined by locations of fixed mooring rings. When necessary, a 45-degree variation of

direction is considered to be satisfactory. Locate each aircraft at slightly more than wing span distance from all other aircraft. Position nose mooring point approximately 3 to 5 feet downwind from ground mooring anchors.

d. Deflate nose wheel shock strut to within 3/4-inch of its fully deflated position.

e. Fill all fuel tanks to capacity, if time permits.

f. Place approved type wheel chocks fore and aft of main gear wheels and nose wheel. Tie each pair of chocks (wood) together with rope or join together with wooden cleats nailed to chocks on either side of wheels. Tie ice grip chocks together with rope. Use sandbags in lieu of chocks when aircraft is moored on steel mats. Set parking brake as applicable.

g. Accomplish aircraft tiedown by utilizing mooring points shown in figure 1-15. Make tie-down with 1/4-inch aircraft cable, using two wire rope clips, or bolts, and a chain tested for a 3000-pound pull. Attach tiedowns so as to remove all slack. (Use a 3/4-inch or larger manila rope if cable or chain tie-down is not available.) If rope is used for

tiedown, use anti-slip knots, such as bowline knot, rather than slip knots. In the event tiedown rings are not available on hard surfaced areas, move aircraft to an area where portable tiedowns can be used. Locate anchor rods at points shown in figure 1-15. When anchor kits are not available, use metal stakes or dead-man type anchors, providing they can successfully sustain a minimum pull of 3000 pounds.

h. In the event nose position tiedown is considered to be of doubtful security due to existing soil condition, drive additional anchor rods expressly at nose tiedown position. Place padded work stand or other suitable support under the aft fuselage tie down position and secure.

i. Place control surfaces in locked position and trim tab controls in neutral position. Place wing flaps in up position.

j. The requirements for dust excluders, protective covers, and taping of openings will be left to the discretion of the responsible maintenance officer or the pilot of the transient aircraft.

k. Secure propellers to prevent windmilling.

l. Disconnect batteries.

NOTE

Where typhoon conditions exist, it is well to remember that the storm appears to pass two times, each time with a different wind direction. This will necessitate turning the aircraft after the first passing.

m. During typhoon wind conditions, mooring security can be further increased by placing sandbags along the wings to break up the aerodynamic flow of air over the wing, there reducing the lift being applied against the mooring by the wind.

n. After high winds, inspect aircraft for visible signs of structural damage and for evidence of damage from flying objects. Service nose shock strut and reconnect batteries.

CAUTION

Do not tow or taxi aircraft with deflated nose shock strut.

1-101. INSTALLATION OF PROTECTIVE COVERS.

1-102. The aircraft is equipped with a complete set of weather-proof protective covers. The protective covers are provided for protection

against frost, ice, and snow and should be installed over the aircraft surfaces, propellers, and components of the aircraft when such weather conditions exist. Cords, tie tapes, and zippers are provided for ease of installation and removal of the protective covers. Refer to table 1-6 for a complete listing of all protective covers used on the aircraft.

NOTE

Before installing protective covers under sub-freezing conditions, prepare aircraft surfaces to be covered in accordance with paragraph 1-111.

1-103. PARKING.

1-104. Parking is defined as the condition under which the aircraft will be secured while on the ground. This condition may vary from the temporary expedient of setting the parking brake and chocking the wheels to the more elaborate mooring procedures described in paragraph 1-97. The proper steps for securing the aircraft must be based on the time the aircraft will be left unattended, the aircraft weight, the expected wind direction and velocity, and the anticipated availability of ground and air crews for mooring and/or evacuation. When practical, head the aircraft into the wind, especially if strong winds are forecast or if it will be necessary to leave the aircraft overnight. Set the parking brake and chock wheels securely, using the type of chocks described in paragraph 1-99b. If extremely heavy winds are anticipated, feather the propellers. Following engine shutdown, position and engage the control locks. (Refer to paragraph 1-105, steps c and d.)

NOTE

All maintenance stands, cowlings, and loose equipment will be suitably secured at all times when left in an unattended condition.

1-105. PARKING BRAKE PROCEDURE. a. Secure power controls and flight compartment switches in accordance with TM 55-1510-201-10.

b. The parking brake system for the U-8D, U-8G, and RU-8D aircraft incorporates two lever-type valves, one for each wheel brake. The valves are mounted on a bracket beneath the floorboards just forward of the pilot's toe brake pedals. They are located in the system

Table 1-6. Protective covers

PART NUMBER	NOMENCLATURE
48D19094	Cover, Pitot Tube
50-534290-5	Cover, Rear Passenger Seat
50-534290-3	Cover, Front Passenger Seat
50-534290-1	Cover, Pilot and Copilot Seat
53J1905L	Cover, Wheel Well, LH
53J1905R	Cover, Wheel Well, RH
53J1904L	Cover, Stabilizer, LH
53J1904R	Cover, Stabilizer, RH
50-590107-1	Cover Assembly, Wing, LH
50-590107-2	Cover Assembly, Wing, RH
50-590108	Cover Assembly, Aircraft Canopy
50-590109-1	Cover Assembly, Aircraft Engine, LH
50-590109-2	Cover Assembly, Aircraft Engine, RH
50-590110	Cover Assembly, Aircraft Propeller

between the wheel brakes and the pilot's master cylinder. Both valves are closed simultaneously by pulling out the parking brake handle. The parking brake system on U-8F aircraft is identical to that on the U-8D, U-8G, and RU-8D aircraft, except that on the U-8F, the two parking valves are mounted on the bulkhead just forward of the pilot's toe brake pedals. Operate the parking brake as follows:

(1) Pump the pilot's toe brake pedals until sufficient hydraulic pressure is built up in the pilot's brake lines, then hold pedals in.

NOTE

The parking brake can be applied only when sufficient hydraulic pressure is built up in the pilot's brake lines. It cannot be activated by using copilot's brake pedals.

(2) Pull parking brake handle out. This will cause the parking brake valves to lock the hydraulic fluid under pressure in the parking brake system, thereby retaining braking action. Release pilot's toe brake pedals.

CAUTION

Do not set parking brakes when the brakes are hot as a result of undue use or during low temperatures. An accumulation of moisture may cause the brakes to freeze. When overheated, the brakes should be permitted to cool before being set.

(3) To release the parking brakes, depress the pilot's toe brakes and push in on the parking brake handle.

c. The control lock (U-8D, U-8G, and RU-8D aircraft) provides positive locking of the aileron, rudder, elevator and throttles. It consists of the control column and throttle lock, and the rudder lock. The control column and throttle lock is a removable U-shaped frame incorporating a pin to lock the ailerons and elevators at the control column, a bar to lock the throttles in the closed position, and a bungee cord to hold the rudder lock in the raised and locked position. The rudder lock is a frame permanently hinged to the floorboards forward of the rudder pedals. This lock is spring-loaded to rest between the rudder pedals on the floor when not in use. It incorporates notches to hold the rudder pedals in neutral position when raised and locked. The control lock is stowed in the map case on the left wall of the pilot's compartment during flight. Install the control lock as follows:

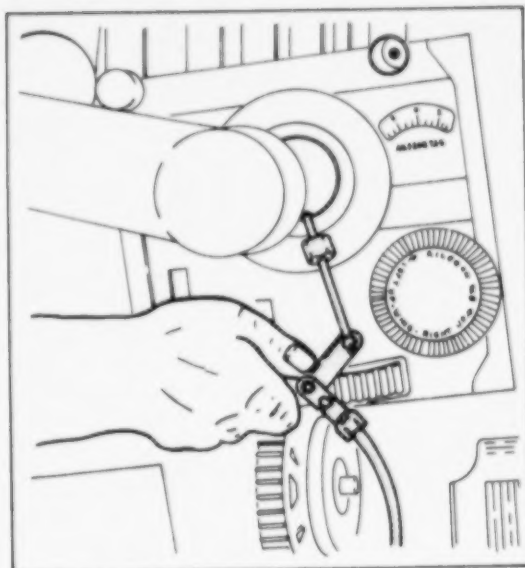
(1) Pull control column back until hole in lower part of control column is exposed (step 1, figure 1-16). Insert pin in control lock through lock frame hole and into hole of control column.

(2) Swing yoke of control lock up and around left side of throttle on control console (step 2). With throttles full back, swing cross bar across into position and latch.

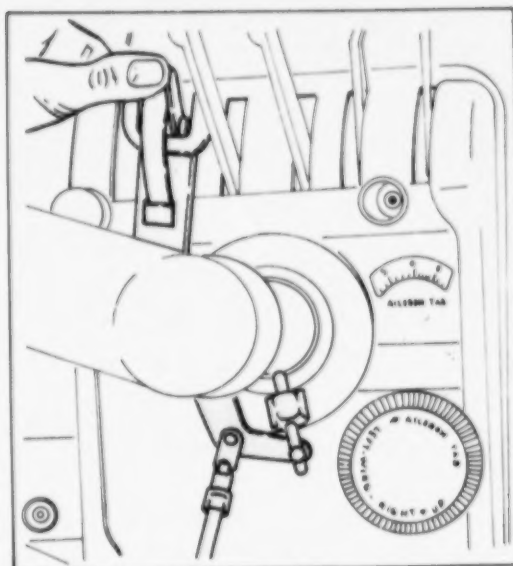
(3) Brace rudder pedals in neutral position and raise rudder lock to secure pedals in notches; then attach bungee cord to eye on rudder lock (step 3).

NOTE

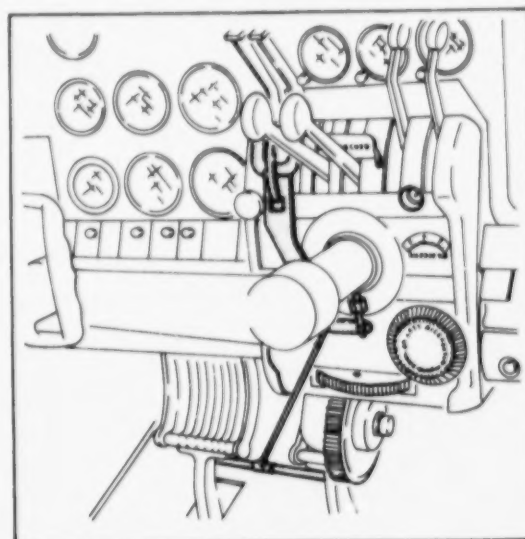
Reverse steps (1) through (3) above to remove control lock. Store control lock in map case.



STEP 1



STEP 2



STEP 3

Figure 1-16. Operation of control lock

WARNING

When the control surfaces are caught by wind or propeller blasts sufficient to cause violent movement against their stops, or under any other circumstances whereby they are brought abruptly to the limit of their stops, a special inspection will be made in accordance with paragraphs 3-5 and 3-9, before the aircraft is flown.

d. The control lock (U-8F aircraft) holds the throttle in closed position, the elevator in down position, and the rudder and aileron in neutral position. The control lock assembly consists of a throttle lock pin, elevator and aileron lock pin, rudder lock pin, and connecting chain. Install the control lock as follows:

(1) With throttles closed, install throttle lock pin through control pedestal to prevent operation of throttle.

(2) Install elevator and aileron lock pin vertically through pilot's control column assembly to lock control wheel in its forward position.

(3) Install rudder lock pin through right-hand pilot's rudder pedal; then neutralize and lock pedals together.

NOTE

Reverse steps (1) through (3) above to remove control lock. Store control lock in map case.

1-106. MOVING AIRCRAFT ON GROUND.

1-107. Aircraft on the ground shall be moved in accordance with the following paragraphs:

1-108. TAXIING. The aircraft, while on the ground, may be moved from one location to another by taxiing. Aircraft taxiing shall be in accordance with applicable operators manual (-10).

1-109. TOWING. Towing lugs are provided on the upper torque knee fitting of the nose strut. Using a hand tow bar (figure 1-17), one man can pull the aircraft on level ramp areas. When it is necessary to tow the aircraft with a vehicle, use the vehicle tow bar (figure 1-18). In the event towing lines are necessary, use towing lugs on the main landing gears. Use towing lines long enough to clear the nose and/or tail by not less than 15 feet. This length is required to prevent the aircraft from overrunning the towing vehicle or fouling the nose gear.

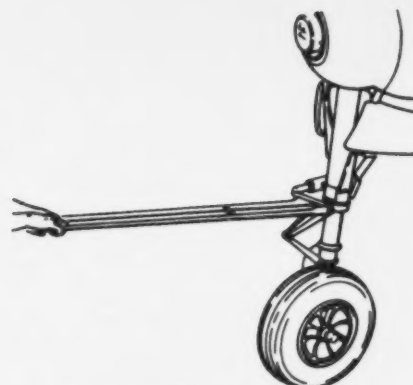


Figure 1-17. Hand tow bar

CAUTION

Clearance of RU-8D dipole antennas on the wings is approximately 23 inches.

CAUTION

Do not tow aircraft with rudder locks installed, as severe damage to the nose steering linkage can result.

CAUTION

When the aircraft is being towed, a qualified person must ride in the pilot's seat to maintain control by use of the brakes.

CAUTION

When being towed from the aft position, do not apply the brakes abruptly. Tow the aircraft slowly, avoiding sudden stops, especially over snowy, icy, rough, soggy, or muddy terrain. Avoid short radius turns, and always keep the inside or pivot wheel turning during the operation. In arctic climates, the aircraft must be towed by the main gears, as an immense break-away load, resulting from ice, frozen tires, and stiffened grease in the wheel bearings, may damage the nose gear.

CAUTION

Do not exceed limits marked on nose strut when towing aircraft.

1-110. SHORT HAUL. Because of engine failure, hazardous flying conditions, or any one of many natural causes, aircraft are sometimes landed in rough terrain or other areas where adequate landing facilities do not exist. Such touchdowns

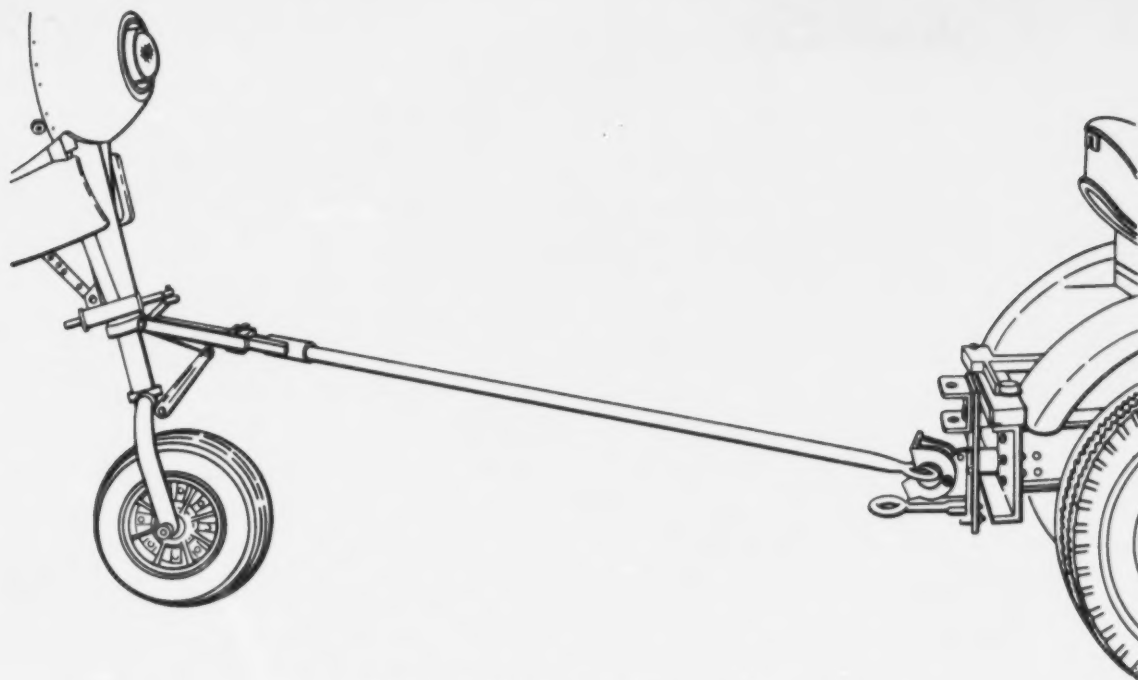


Figure 1-18. Towing the aircraft

often result in damage so extensive as to require the repair available only at depot level of maintenance. When this occurs in areas remote from such facilities, the problem of transporting the damaged aircraft arises. Proper methods of loading, unloading, and anchoring the damaged aircraft must be employed. For an extensive coverage of the methods designed for short haul movement of aircraft with a maximum of safety, refer to TM 1-U8-S.

1-111. ANTI-ICING AND DEICING.

1-112. The aircraft is protected in subfreezing weather by spraying aircraft surfaces to be covered with protective covers with defrosting fluid (item 10, table 1-8). Spraying defrosting fluid on aircraft surfaces before installing protective covers will permit protective covers to be removed with a minimum of sticking. To prevent freezing rain and snow from blowing under

Table 1-7. Defrosting fluid dilution chart

AMBIENT TEMPERATURE (F°)	PERCENT DEFROSTING FLUID BY VOLUME	PERCENT WATER BY VOLUME	FREEZING POINT OF MIXTURE (°F) (APPROXIMATE)
+30° and above	20	80	+10°
+20°	30	70	0°
+10°	40	60	-15°
0°	45	55	-25°
-10°	50	50	-35°
-20°	55	45	-45°
-30°	60	40	-55°

Note

Heat mixture to a temperature of 180° to 200°F (82° to 93°C).

protective covers and diluting the fluid, ensure that protective covers are fitted tightly. As a deicing measure, keep exposed aircraft surface wet with fluid for protection against frost.

NOTE

Do not apply defrosting fluid on exposed aircraft surfaces, if snow is expected, as melting snow will dilute the defrosting fluid and form a slush mixture which will freeze in place and become difficult to remove.

1-113. ANTI-ICING TREATMENT. Use undiluted defrosting fluid (item 10, table 1-8) to treat aircraft surfaces for protection against freezing rain and frost. Spray aircraft surface sufficiently to wet area, but without excessive drainage. A fine, fan-shaped spray is recommended to prevent waste.

1-114. DEICING TREATMENT. Use undiluted defrosting fluid (item 10, table 1-8) to remove frost from aircraft surfaces. Use diluted, hot fluid to remove ice accumulations.

a. Remove frost or ice accumulations from aircraft surfaces by spraying with diluted defrosting fluid mixed in accordance with table 1-7.

b. Spray diluted, hot fluid in a solid stream (not over 15 gallons per minute). Thoroughly saturate aircraft surface and remove loose ice. Keep a sufficient quantity of diluted, hot fluid on aircraft surface coated with ice to prevent liquid layer from freezing. Diluted, hot fluid should be sprayed at a high pressure, but not exceeding 300 psi.

c. When facilities for heating are not available and it is deemed necessary to remove ice accumulations from aircraft surfaces, undiluted defrosting fluid may be used. Spray undiluted defrosting fluid at 15-minute intervals to assure complete coverage. Removal of ice accumulations using undiluted defrosting fluid is expensive and slow.

d. If tires are frozen to ground, use undiluted defrosting fluid to melt ice around tire. Move aircraft as soon as tires are free.

1-115. APPLICATION OF EXTERNAL POWER.

1-116. An external power source is often needed to supply the electric current required to properly ground service the aircraft electrical equipment and to facilitate starting the aircraft's engines. An external power receptacle is install-

ed on the outboard side of the left engine nacelle. Since the external supply receptacle is directly connected to the aircraft bus system, external power is available regardless of the position of the battery switch.

WARNING

Before connecting the power cables from the external power source to the aircraft, ensure that the generator is not touching the aircraft at any point. Due to the voltage drop in the cables, the two ground systems will be of different potentials. Should they come in contact while the generator is operating, arcing could occur. Turn off all external power while connecting the power cable with or removing it from the external power supply receptacle.

CAUTION

Be certain that the polarity of the external power source is the same as that of the aircraft before it is connected.

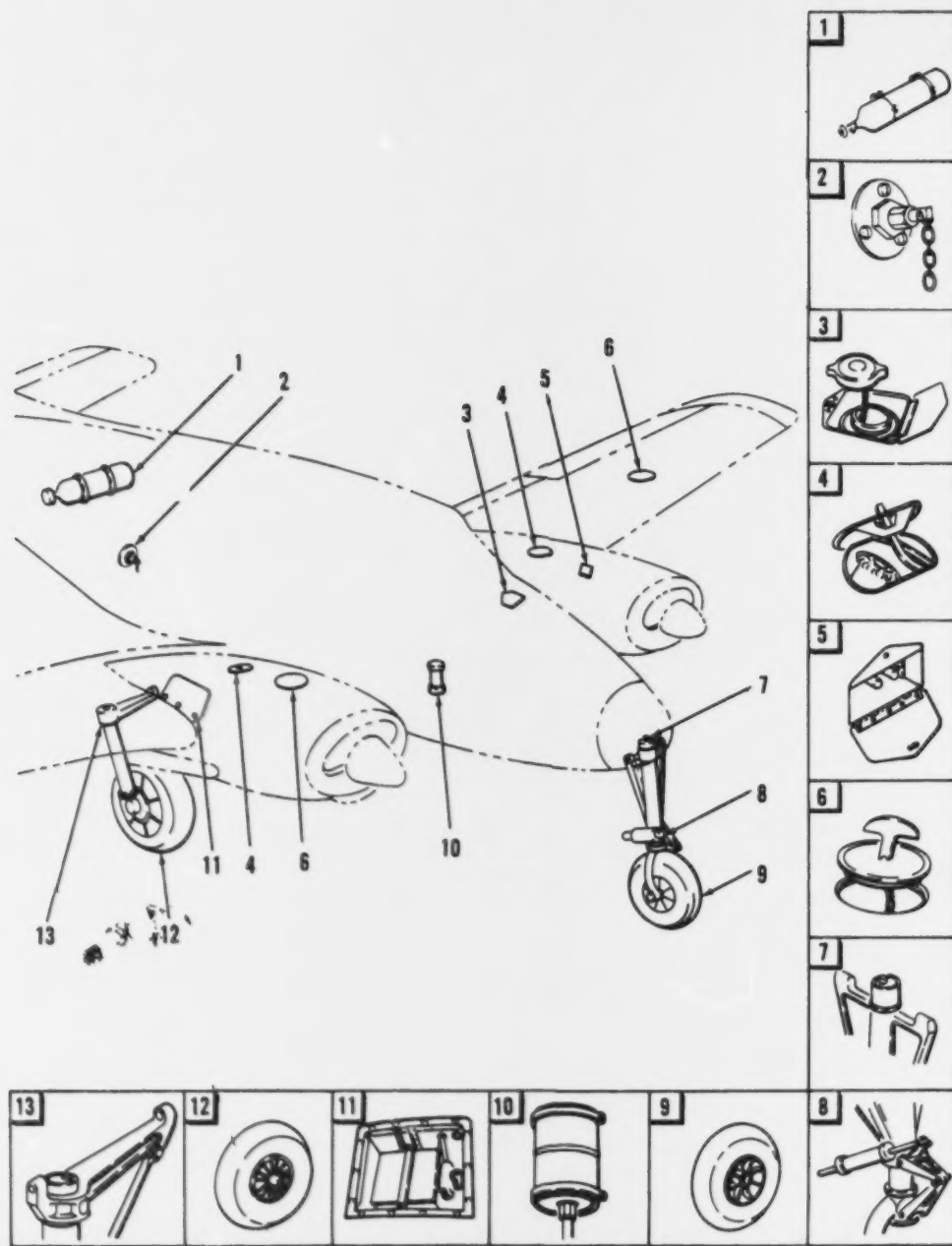
1-117. SERVICING.

1-118. Servicing the aircraft includes the replenishment of fuel, oil, hydraulic fluid, other liquids, tire pressures, and other items required to completely service the aircraft. (See figures 1-19 and 1-20.) The lubrication requirements of the aircraft are covered in Chapter 2. Refer to table 1-3 for identification of fuel, oil, etc. used to service the aircraft. The servicing instructions give, in detail, the procedures and precautions necessary to completely service the aircraft.

1-119. SERVICING SAFETY PRECAUTIONS.

1-120. While servicing the aircraft, personnel will observe the following precautions:

- a. When not in use, remove all work stands or other equipment from the area which might be hazardous obstacles, or which might interfere with the regular servicing procedures.
- b. Provide drip pans at points where grease or oil may drip from the aircraft or servicing equipment. Remove all grease or oil deposits.
- c. Do not permit any source of ignition, such as an open flame or any spark producing device, in the immediate area where the aircraft



- | | |
|---|--|
| 1. Oxygen supply cylinder (U-8D) | 8. Nose wheel shimmy damper reservoir |
| 2. Oxygen cylinder filler valve (U-8G) | 9. Nose landing gear tire inflation valve |
| 3. Anti-icer tank filler | 10. Brake fluid reservoir |
| 4. Oil filler | 11. Battery |
| 5. External power receptacle | 12. Main landing gear tire inflation valve |
| 6. Main and auxiliary fuel tank fillers | 13. Main landing gear shock strut filler |
| 7. Nose landing gear shock strut filler | |

Figure 1-19. Servicing diagram (U-8D, U-8G, and RU-8D)

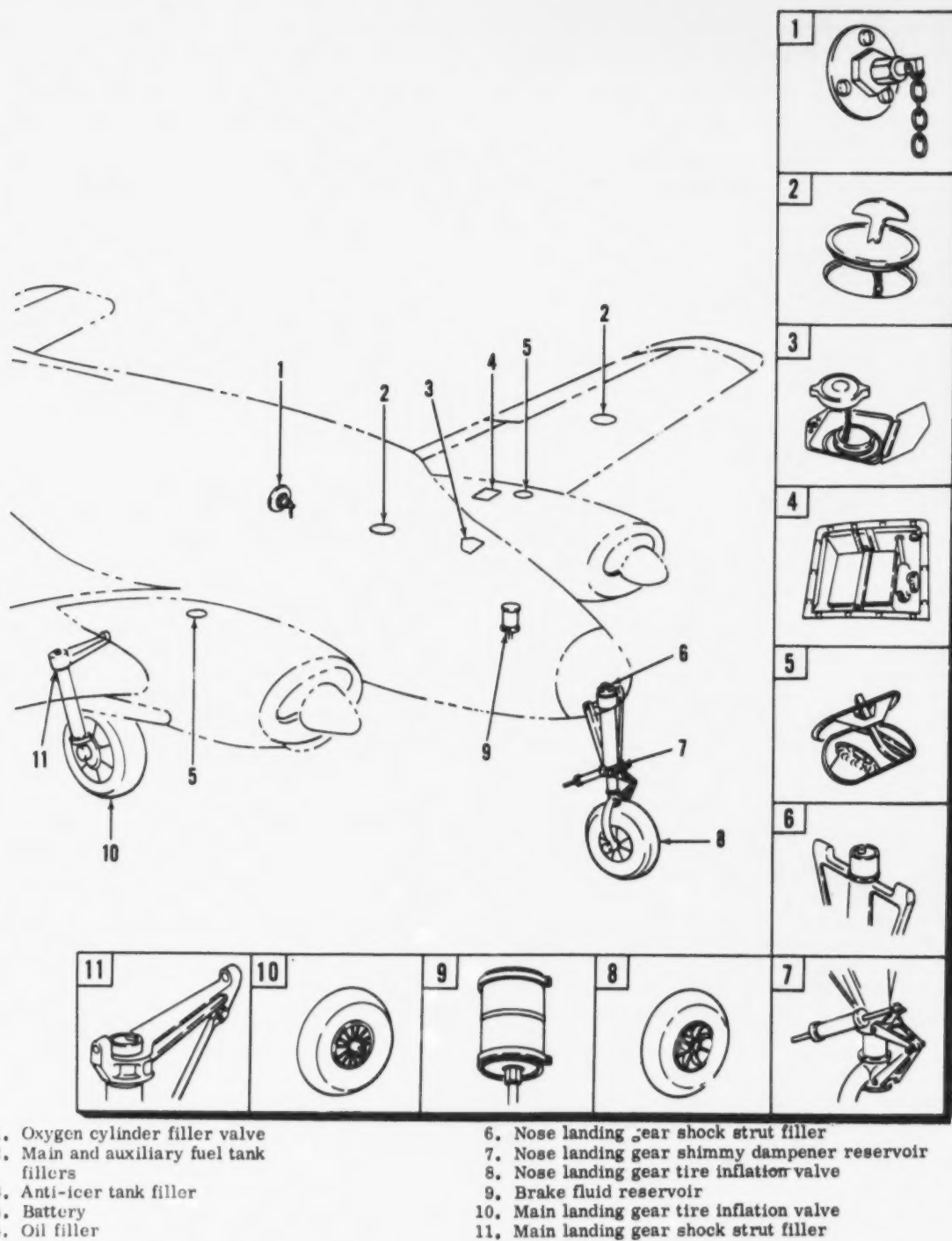


Figure 1-20. Servicing diagram (U-8F)

is being serviced with fuel or oil.

d. Do not use gasoline as a solvent for cleaning aircraft components.

e. Ground all stationary or portable machinery and equipment which may generate static electrical charges when in the vicinity of flammable grease or liquids. Use only a clean, unpainted metal surface to make contact between the conductor and ground. The possibility of the collection of flammable fumes or of the presence of spilled flammable liquids necessitates adequate grounding in such areas to prevent an accumulation of static charges which might ignite the flammable gases.

1-121. SERVICING UNDER EXTREME WEATHER CONDITIONS.

1-122. Refer to TM 55-1500-204-25/1 for servicing procedures under extreme weather conditions.

1-123. SERVICING FUEL SYSTEM.

1-124. The fuel system contains a 8 bladder-type fuel cells which have a total capacity of 230 gallons. The main fuel tanks are located, one in each wing root, between the fuselage and the engine nacelle. On the U-8D, U-8G, and RU-8D, they are interconnected to provide a crossfeed from either main tank to either or both engines. The access doors from the main fuel tanks are flush-mounted on the upper surface of the wing between the nacelle and the fuselage. Sump drains are provided on the underside of the wing. Each main fuel tank has an expansion volume of 0.9 gallon, a sump capacity of 0.06 gallon, and a total capacity of 44 gallons, to make a new fuel capacity of 43.94 gallons. The auxiliary cells in each wing function as a tank. The cells are interconnected. A single fuel supply line drains all three auxiliary fuel cells simultaneously. The auxiliary cells are filled through a single filler neck located in each outboard wing panel and their common level is indicated on a single gage. The fuel sump drains, located in each of the rear inboard auxiliary cells, should be drained before each flight. With an expansion volume of 1-1/2 gallons and a sump capacity of 0.06 gallon, each auxiliary fuel tank has total fuel capacity of 71 gallons and a net fuel capacity of 70.94 gallons.

NOTE

Service the fuel tanks after each flight to keep the bladder-type cells from drying out and cracking.

Three auxiliary fuel cells are located in each outboard wing as follows: one in each wing panel leading edge from wing station 99.616 to wing station 148.735, one in each wing panel between the forward and rear spars from wing station 99.616 to wing station 131.235, and one in each wing panel between the forward and rear spars from wing station 131.235 to wing station 184.016.

NOTE

The auxiliary fuel cells on U-8F aircraft are interconnected to provide a crossfeed between them and the main fuel cells to either or both engines.

1-125. FUEL HANDLING PRECAUTIONS. While handling fuel, it is well to remember that gasoline has highly flammable and explosive properties. Since it is heavier than air, dangerous concentrations of gasoline vapor often form at points of escape from the fuel tanks, making breathing hazardous in the immediate vicinity of such concentrations. These pockets of vapor are also a potential source of explosion or fires which can be touched off by sparks of static electricity, sparks from tools, hot exhaust sparks, lighted cigarettes, electrical devices, or any heat producing agency. To ensure a maximum amount of safety during fueling of the aircraft, the following precautions will be observed:

- a. When possible, service the aircraft with cold soaked fuel, as cold soaked fuel has been chilled until the volume decreases, thereby allowing more fuel to be carried in the fuel tanks.

WARNING

When conditions permit, the aircraft should be positioned so that the wind will carry the gasoline vapors away from all possible sources of ignition. The fueling vehicle shall be positioned to maintain a minimum distance of 10-feet from any part of the aircraft, while maintaining a minimum distance of 20-feet between fueling vehicle and fuel filler point.

b. Shut off all electrical equipment on the aircraft, including radar and radar equipment. Do not service batteries during the fueling operation. The master switches may be left on, but they must not be operated during the fueling

operation. Do not operate any electrical tools, such as drills or buffers, in or near the aircraft during fueling.

c. Refuel aircraft as soon as possible after landing.

d. Keep fuel servicing nozzles free of snow, water, and mud at all times.

WARNING

Prior to opening the fuel tank filler, the nozzle static wire clamp must be attached to the wing.

e. Carefully remove snow, water, and ice from the aircraft fuel filler cap area before removing the fuel filler cap. Remove only one aircraft tank filler cap at any one time, and replace each one immediately after the servicing operation is completed.

f. Wipe all frost from fuel filler necks before servicing.

g. Drain water from fuel tanks, filler cases, and pumps 15 minutes after each servicing, 30 minutes after each removal from heated shelter, and after each flight. Preheat, when required, to ensure free fuel drainage.

h. Insofar as possible, leave only fully serviced aircraft outside.

i. Maintain alert hangars and heated maintenance shelters at the lowest possible temperature consistent with comfortable working conditions.

j. Avoid dragging the gasoline hose where it can damage the soft, flexible surface of the de-icer boots.

k. Ensure that the aircraft and components being serviced are securely coupled to a low resistance ground. Connect the static ground cable and the fueler to a grounding stake. When engaged in the fueling operation, discharge the static electricity accumulated by the body and clothing by touching the ground cable or stake before each operation.

l. Observe NO SMOKING precautions.

m. Prior to transferring the fuel, ensure that the hose is grounded to the aircraft.

n. Wipe off spilled fuel immediately.

o. Handle the fuel hose and nozzle cautiously to avoid damaging the wing skin.

p. Do not conduct fueling operations within 100 feet of energized airborne radar equipment or within 300 feet of energized ground radar equipment installations.

q. Wear only nonsparking shoes near aircraft or fueling equipment, as shoes with nailed soles or metal heel plates can be a source of sparks.

1-126. FUEL HANDLING PRECAUTIONS FOR EXTREME WEATHER CONDITIONS. When fueling is conducted on ice or on sandy or desert terrain, or when a satisfactory ground cannot be secured, additional precautions must be taken

to avoid the buildup of static electricity. Since draining the static charges is not possible without an adequate ground, reliance must be placed on equalizing the potentials in order to prevent a dangerous sparking discharge, as in the following bonding procedure:

a. Connect grounding cable from fuel truck or drum to satisfactory ground, such as grounding post.

NOTE

Grounding posts usually consists of pipes or rods 1/2 to 3/4-inch in diameter. These rods are usually made of galvanized iron, steel, or copper weld steel and are driven far enough into the ground to reach below the permanent ground moisture level point.

b. Connect grounding cable from ground to some convenient unpainted metal part of the aircraft, excluding propellers or antennas.

c. Connect bonding cable from fuel truck or drum to aircraft. A conductive-type fuel hose is not a satisfactory method of bonding.

d. Connect bonding cable from fuel nozzle to aircraft before fuel tank cover is opened.

e. When disconnecting, reverse the order of steps a through d above.

1-127. FILLING FUEL TANKS. a. Observe precautions outlined in paragraph 1-118.

b. Attach bonding cables to aircraft and fuel servicing unit.

c. Open applicable fuel tank access door. (See figures 1-7 and 1-8).

d. Attach bonding cable from hose nozzle to ground sockets adjacent to fuel tank being filled. Touch hose nozzle to aircraft surface to discharge static electricity.

e. Remove filler cap from filler neck and insert hose nozzle in filler neck.

f. Fill fuel tank with gasoline 115/145 (item 1, table 1-8). (Refer to table 1-3 for alternate grade).

g. Remove hose nozzle from filler neck, and install filler cap on filler neck when fuel tank has been filled.

h. Secure applicable fuel tank access door.

i. Remove bonding cables from aircraft and fuel servicing unit.

1-128. DRAINING FUEL SYSTEM. a. Observe precautions outlined in paragraph 1-119.

b. Gain access to bottom of fuel tank to be drained by removing applicable access panel (see figures 1-7 and 1-8).

- c. Position suitable container adjacent to fuel tank.
- d. Attach bonding cables to aircraft and to fuel container.
- e. Connect drain hose to quick drain on fuel tank sump and to fuel container.
- f. Open quick drain by pressing valve up against quick drain spring and rotating 90 degrees.

WARNING

Avoid fuel spillage; however, if during draining operation fuel is spilled, suspend draining operation, notify fire department, and mop up spilled fuel. Place saturated mopping material in a closed container and remove from area.

- g. Remove strainer assemblies from fuel selector valves after fuel has drained from fuel tank. (Refer to paragraph 5-106.)
- h. Repeat steps c through f above, and drain remaining fuel tanks.
- i. Position suitable fuel container adjacent to fuel system strainer.
- j. Attach bonding cables to aircraft and fuel container.
- k. Connect drain hose to drain valve and fuel container.
- l. Open drain valve and drain fuel. Close drain valve.
- m. Remove fuel filters from U-8F aircraft fuel systems. (Refer to paragraph 5-110.)
- n. Clean and inspect strainer assemblies and fuel filters. (Refer to paragraphs 5-106 and 5-110.)
- o. Install strainer assemblies. (Refer to paragraph 5-106.)
- p. Install fuel filters. (Refer to paragraph 5-110.)
- q. Install all removed access panels.

1-129. DRAINING MOISTURE FROM FUEL SYSTEM. To remove moisture and sediment from the aircraft fuel system, a quick drain is provided in each fuel tank and a drain valve is provided in each fuel system strainer. Take fuel samples from fuel tanks and fuel system strainers daily, or more frequently as operating conditions require. Draw approximately 1/3 pint of fuel from each source.

1-130. SERVICING OIL SYSTEM.

1-131. The oil tank is installed in each nacelle

just behind the engine firewall. An access door (figure 1-7 and 1-8) is provided in the nacelle for filling the oil tank and checking the oil level.

1-132. COLD WEATHER MAINTENANCE OF OIL SYSTEM. If ambient temperature is below 10°F (-12°C), the aircraft should be serviced with lubricating oil (item 79, table 1-8). (Refer to table 1-3.) In extremely cold weather, it may be necessary to preheat the lubricating oil prior to starting. Avoid operating engines excessively on the ground. The danger of condensation in oil tanks necessitates frequent checking and draining of the oil sumps. Since metal contraction often leads to leakage, the oil lines must be checked frequently.

1-133. FILLING OIL SYSTEM. a. Remove applicable access door on top of engine nacelle to gain access to oil tank filler neck. (See figures 1-7 and 1-8.)

b. Observe precautions outlined in paragraph 1-119.

c. Remove oil filler cap.

d. Insert hose nozzle from oil servicing unit or spout of an oil can in filler neck.

e. Fill oil tank to FULL mark on dipstick with lubricating oil (item 2, table 1-8). (Refer to table 1-3.)

CAUTION

Avoid spilling oil. Any oil spilled must be removed immediately. Use a cloth moistened in solvent (item 6, table 1-8) to remove oil.

f. Install oil filler cap and fasten access door on engine nacelle.

1-134. DRAINING OIL SYSTEM. Start engine in accordance with TM 55-1510-201-10, and operate engine until normal operating temperatures are established.

b. Stop engine in accordance with TM 55-1510-201-10.

c. Position suitable oil container adjacent to oil tank, attach drain hose to oil container, and position funnel directly below oil drain valve on aft side of engine firewall.

d. Open oil drain valve, drain oil tank, and close oil drain valve.

e. Inspect oil filter in accordance with paragraph 5-144.

f. Flush oil cooler in accordance with paragraph 5-140.

g. Fill oil system in accordance with paragraph 1-133 above.

NOTE

In a hot, dry climate, extremely dusty conditions may make it necessary to change oil before the specified times.

1-135. SERVICING HYDRAULIC SYSTEMS.

1-136. The aircraft has hydraulic systems for operation of the brake system and the shimmy damper.

1-137. Servicing hydraulic systems under extreme weather conditions. Each component of the aircraft's various hydraulic systems uses hydraulic fluid (item 3, table 1-8). Under hot, dry conditions with high winds and blowing sand, it is especially important that all components of the hydraulic system be kept clean of grease and spilled hydraulic fluid. When mixed with oil or oil based fluids, sand and dust become abrasives capable of inflicting considerable damage upon close-fitting or moveable parts. Under extremely cold conditions, the landing gear shock struts and hydraulic pistons must be kept clean of dirt and ice. In extremely low temperatures, shock absorber packings lose much of their resiliency and, consequently, are easily cut by grit and ice. Wipe all components clean with a cloth soaked in hydraulic oil. When necessary, solvent (item 6, table 1-8) can be used to remove dirt. The cleaned equipment must then be relubricated with hydraulic fluid. During extremely cold weather, difficulty may arise from condensation and freezing in the hydraulic reservoirs. When this occurs, apply heat locally until the hydraulic fluid is thawed. Fluid leakages are aggravated by sudden temperature changes when metals contract or expand and rubber seals harden; therefore, the hydraulic fluid system must be frequently inspected for leaks before the loss of hydraulic fluid becomes serious.

1-138. FILLING BRAKE HYDRAULIC SYSTEM RESERVOIR. a. Gain access to brake hydraulic system reservoir.

NOTE

The hydraulic brake system reservoir for the U-8D, U-8G, and RU-8D aircraft is located on the right side, forward of the rear bulkhead at F.S. 73.00, in the nose equipment compartment, and on the left side at F.S. 84.00, for the U-8F aircraft.

b. Remove brake reservoir cap and fill reservoir within 1 inch of top of reservoir with hydraulic fluid (item 3, table 1-8). (Refer to table 1-3.)

c. Install brake reservoir cap.

1-139. FILLING SHIMMY DAMPER. a. Insert a wire of approximately 1/16-inch through hole in disk at aft end of shimmy damper piston rod until it touches bottom of small hole in floating piston.

b. Mark wire, remove it, and measure depth of insertion. This distance should not exceed 4 inches.

NOTE

The inner plug of the floating piston has a 1/8-inch hole drilled in the rear face. When checking the distance from the rear disk to the piston, it must be determined whether the wire is inserted in the hole or is riding on the face of the piston outside the hole. The difference between the two dimensions will be approximately 1/2-inch; this difference must be taken into consideration when determining the fluid level. It is recommended that the wire be inserted in the hole of the floating piston instead of letting it rest against the face of the piston. To determine if the wire is inserted in the hole, insert the wire a number of times and note each dimension. When the shimmy damper is full, the distance from the end of the piston rod to the bottom of the hole in the floating piston is $2-1/8 \pm 1/4$ inches. The empty reading is approximately $5-1/2$ inches. The distance from the disk to the bottom of the small hole in the piston should not exceed 4 inches and/or the distance from the disk to the face of the piston should not exceed $3-1/2$ inches. Either dimension may be used to determine the fluid level. However, the wire must be inserted a number of times and the dimensions compared in order to determine the greater depth of insertion.

c. If dimension exceeds that specified in step (b), fill shimmy damper with hydraulic fluid as follows:

- (1) Remove shimmy damper from landing gear shock strut. (Refer to paragraph 4-285.)
- (2) Remove snap ring and disk assembly.

WARNING

Stand clear of the end of the piston, as the spring behind the disk will come out with considerable force.

(3) Insert an AN3 bolt of approximately 6 inches in length into plug behind spring and remove plug.

(4) Completely fill piston rod with hydraulic fluid, (item 3, table 1-8).

(5) Place fitting end in a vice and slowly work housing to extreme limit of travel several times to displace any air which may be trapped inside main chamber. Refill piston rod with hydraulic fluid.

(6) Install plug and remove bolt from plug.

(7) Install spring, disk, and snap ring.

(8) Install shimmy damper on landing gear shock strut. (Refer to paragraph 4-285.)

1-140. SERVICING ALIGHTING GEAR.

1-141. Servicing the alighting gear consists of maintaining the correct tire pressure of the nose and main landing gear and ensuring that the shock struts are filled to the proper level with hydraulic fluid (item 3, table 1-8) and inflated to the correct height. Oil, fuel, and hydraulic fluids have a deteriorating effect on rubber tires. The absorption of excessive amounts of these fluids by the tires will produce an oil-swelled tread which breaks the adhesive bar between the rubber and the metal in the treads. For tires to remain serviceable, they must be kept clean of all oils, fuels, and hydraulic fluids. During excessive cold weather operations, when temperatures range below -35°F (-37°C), tire treads may freeze to the ground. (In such cases, the tires may be released either by the application of heat, undiluted defrosting fluid (item 10, table 1-8), or by overinflation. When heat is applied to release tires, the temperature of the heat should not exceed 160°F (71°C). Tires must not be inflated more than 1-1/2 times the normal pressure in the efforts to release them from the ice.

WARNING

Before overinflating, check the tires for indications of breaks, and for wheel cracks. Stand in line with the tire rather than broad side of the wheel in order to avoid injury should the rim fail during overinflation.

1-142. INFLATING TIRES. a. Inflate main tires to a pressure between 40 and 43 psi.

b. Inflate nose wheel tire to a pressure between 30 and 35 psi.

1-44

1-143. FILLING ALIGHTING GEAR SHOCK STRUTS. a. Place aircraft on jacks. (Refer to paragraph 1-93.)

b. Release air from alighting gear shock strut by depressing valve core with pneumatic valve repair tool (NSN 5120-00-308-3809) in the plug on top of alighting gear shock strut.

WARNING

Because of the danger of the plug blowing free with sufficient force to injure servicing personnel, always loosen the plug enough to allow the air pressure behind it to dissipate before completely removing.

c. After air is completely expelled, remove filler plug.

d. Using a small hydraulic jack, compress the alighting gear shock strut.

e. Fill compressed alighting gear shock strut with hydraulic fluid (item 3, table 1-8) to within 2 inches of top of strut or to bottom of the filler gage on top of strut, or to bottom of filler gage on bottom of filler plug.

f. Extend and collapse shock strut several times by raising and lowering the jack to remove any air that may still be trapped in the cylinder.

NOTE

Only filler plugs to be used are plugs which are assigned to NSN 1620-00-217-5696.

g. Refill cylinder as specified in step (5) above and install filler plug.

h. Remove aircraft from jacks.

i. Inflate cylinder with air to the proper height. Inflate each main shock strut until 3 inches of the piston are exposed. Inflate nose strut until 5 inches of the piston is exposed.

CAUTION

Never allow the aircraft to be taxied with a flat alighting gear shock strut. The alighting gear shock strut will jam in this position and, upon retraction, may jam the gear or cause major structural damage.

1-144. SERVICING OXYGEN SYSTEM.

1-145. The oxygen system for the U-8D aircraft furnishes breathing oxygen to the pilot, copilot,

and three passengers. The oxygen cylinder is located on the forward side of the baggage compartment bulkhead. It has a capacity of 38.4 cubic feet when charged to 1800 psi. The oxygen system for the U-8G provides breathing oxygen for the pilot, copilot, and four passengers. Oxygen is supplied by an oxygen supply cylinder located beneath the aft baggage compartment floor board. When charged to a pressure of 1800 psi, the cylinder has a capacity of 63.3 cubic feet. The oxygen system for the U-8F aircraft furnishes breathing oxygen to the crew and passengers from a stationary cylinder located beneath the baggage compartment shelf. At a pressure of 1800 psi, the oxygen cylinder has a capacity of 63.10 cubic feet. Refer to paragraphs 11-93 through 11-141 for maintenance instructions.

1-146. OXYGEN SYSTEM SAFETY PRECAUTIONS. The utmost care must be exercised in servicing, handling, and inspecting the oxygen system. Observe the following precautions:

- (1) Connect ground cable from oxygen cart to satisfactory ground, such as a grounding post.

NOTE

Grounding points usually consist of pipes or rods 0.50 to 0.75 inch in diameter. These rods are usually made of galvanized iron, steel, or copper weld steel and are driven far enough into the ground to reach below the permanent ground moisture level points.

- (2) Connect grounding cable to some convenient unpainted metal part of aircraft, excluding propellers or antennas.

- (3) Connect bonding cable from aircraft to oxygen servicing unit.

- (4) When disconnecting, reverse the order of 1 thru 3.

- a. Keep oxygen regulators, cylinders, gages, valves, fittings, masks, and all other components of the oxygen system free of oil, grease, gasoline, and all other readily combustible substances.

- b. Do not allow foreign matter to enter oxygen lines.

WARNING

The presence of foreign matter in the high pressure lines can cause an explosion. When coming in contact with oxygen equipment keep hands, tools, and clothing absolutely clean.

- c. Never attempt to repair or repaint oxygen equipment.

- d. Keep fire and heat away from oxygen equipment. Do not smoke while working with or near oxygen equipment, and take care not to generate sparks with carelessly handled tools when working on the oxygen system.

- e. Never allow electrical equipment to come in contact with the oxygen cylinder.

- f. Never use oxygen from a cylinder without first reducing its pressure through a regulator.

1-147. REPLENISHING OXYGEN SYSTEM (U-8D). Replenish the oxygen system by replacing the empty oxygen cylinder with a fully charged cylinder. (Refer to paragraph 11-95.)

1-148. REPLENISHING OXYGEN SYSTEM (U-8G and U-8F). a. Observe safety precautions outlined in paragraph above. Attach bonding cable to aircraft.

- b. Remove protective cap on oxygen cylinder filler valve (2, figure 1-19 or 1, figure 1-20).

- c. Attach hose from servicing unit containing oxygen (item 5, table 1-8) to filler valve.

NOTE

If the oxygen cylinder pressure is below 50 psi, purge the oxygen system in accordance with paragraph 11-141.

- d. Ensure that supply cylinder shutoff valve on the aircraft is open.

- e. Fill system slowly, to prevent overheating, by adjusting recharging rate with pressure regulating valve on oxygen servicing unit.

- f. Close pressure regulating valve on oxygen servicing unit when pressure gage on oxygen cylinder indicates 1800 psi.

- g. Disconnect oxygen hose from oxygen servicing unit and filler valve.

- h. Install protective cap on oxygen filler valve. Disconnect bonding cable from aircraft.

1-149. SERVICING ANTI-ICING SYSTEM.

1-150. The anti-icing system for the U-8D, U-8G, and RU-8D aircraft supplies anti-icing fluid to the propeller blades to prevent ice from forming on the propellers during flights in icing conditions. The anti-icing system for the U-8F aircraft supplies anti-icing fluid to the propellers and the windshield to prevent icing during flights in cold weather. The anti-icing supply tank is located in the left wing between the nacelle and fuselage. It has a capacity of 3 U.S. gallons. Access to the anti-icing supply tank filler (3, figure 1-19, or 3, figure 1-20) is provided by a door located on the upper surface of the left wing. The supply tank should be checked and filled with Isopropyl Alcohol (item 4, table 1-8) before each cold weather flight.

1-151. FILLING ANTI-ICING SYSTEM. a. Gain access to anti-icing supply tank filler (3, figure 1-19, or 3, figure 1-20) by opening propeller anti-icing access door (8, figure 1-7, or 8, figure 1-8).

b. Remove filler cap.

c. Fill anti-icing supply tank to proper level with Isopropyl Alcohol (item 4, table 1-8).

d. Install filler cap.

e. Secure propeller anti-icing access door.

1-152. Deleted.

1-153. Deleted.

1-154. Deleted.

1-155. SERVICING BATTERIES.

1-156. On U-8D and U-8G aircraft, two 12-volt, 33 ampere hour, lead-acid batteries are installed to provide 24-volt power. One battery is located in each upper outboard side of each engine nacelle; these batteries are connected together in series. On U-6F aircraft, a single 24-volt, 13 ampere hour, nickel-cadmium battery is installed in the upper part of the left engine nacelle. The batteries are installed to provide energy to start the engines and to operate electrical equipment during low engine rpm ground operation, when low or no generator output is produced. Lead acid batteries will be serviced in accordance with TM 10-1690A. Servicing of nickel-cadmium batteries will be accomplished in accordance with TM 11-6140-204-12.

1-157. CLEANING.

1-158. The maintenance of the aircraft requires a comprehensive program of preventive maintenance adapted to the specific operating conditions of the aircraft. Dirt, grit, and sand will accelerate wear of moving parts, aid in deterioration of painted and polished surfaces, and generally mar the

appearance of the aircraft. Periodic washing and cleaning, inspection, recognition and treatment of corrosion, and touch-up of surfaces which have lost their protective coatings will add to the life of the aircraft. The following paragraphs give, in detail, the recommended procedures for aircraft surface maintenance. The procedures should be incorporated into the maintenance program of operating units as dictated by experience gained under specific operating conditions.

NOTE

Lubrication points that are exposed during cleaning must be lubricated in accordance with Chapter 2. When wheels are exposed to an abnormal quantity of water, wheel bearings must be repacked.

1-159. GENERAL CLEANING INSTRUCTIONS.

1-160. Refer to TM 55-1500-333-24 for general cleaning instructions. Although most of the electrical equipment is adequately protected during normal cleaning procedures, ensure that moisture-sensitive microswitches, battery relays, electrical connections, and other such components located in exposed positions are covered and/or masked by a suitable waterproof material. Hand wiping or brushing is the most satisfactory method of cleaning areas containing these parts.

CAUTION

During steam cleaning operations, ensure that all exposed electrical wiring, switches, and other components are adequately covered and protected from the heat of the steam jet.

1-161. CLEANING RADOME AND ANTENNA COVERS. a. Wash covers thoroughly with mild soap, (item 23, table 1-8) and water.

b. Remove any oil or grease stains by wiping cover surfaces with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

1-162. CLEANING TIRES, DEICER BOOTS AND OTHER RUBBER PRODUCTS. To remove the evidences of light soiling, apply cleaning compound (item 25, table 1-8) to soiled area and wipe down by hand or with a soft fiber brush. Rinse surface with clean water and wipe dry.

1-163. CLEANING RELIEF TUBE. To clean and deodorize relief tube system, mix a solution of 1-1/2 ounces of deodorant (item 26, table 1-8) to 1 quart of water.

a. Using a soft bristled brush and deodorant solution, wash area around relief tube horn and exit.

b. Pour remainder of deodorant solution through relief tube. If offensive odor remains, use a stronger deodorant solution and reclean.

1-164. LIST OF CONSUMABLE MATERIALS.

1-165. All consumable materials, such as anti-icing and deicing fluids, cements, cleaning compounds, greases, hydraulic fluid, oils, sealants, solvents, etc., authorized for use at organizational level, are listed in table 1-8.

1-166. SPECIAL TOOLS AND EQUIPMENT.

1-167. The special tools and equipment used

in organizational maintenance are illustrated and listed in TM 55-1510-201-20P, Organizational Maintenance Repair Parts and Special Tool Lists. Special tools and equipment illustrations will appear in this technical manual when the text is not sufficient to fully describe such operation.

1-168. EXTENSIONS AND ADAPTERS.

1-169. Under certain conditions it will be necessary to use an extension or an adapter on a torque wrench. (See figure 1-21.) When a torquing application is such that the extension or adapter is in line with the torque wrench, the correct setting for a torque wrench may be found by the following equation.

a. T_i = Torque reading on indicator dial of torque wrench.

L_w = Length of the torque wrench.

L_a = Length of Adapter.

L = Total length of wrench and adapter.

T = Desired torque on nut or bolt.

Proper torque reading: $T_i = \frac{L_w}{L} \times T$

b. For example, if it is desired to have 2000 inch pounds applied to a nut T_i would be found, for an assumed situation, as follows:

L_w = 16 inches

L_a = 4 inches

L = 20 inches

T = 2000 inch-pounds

$T_i = \frac{L_w}{L} \times T = \frac{16 \text{ inches}}{20 \text{ inches}} \times 2000 \text{ inch pounds}$

=1600 inch pounds

NOTE

Whenever possible, always attach the extension of adapter in line with the torque wrench. When it is necessary to attach the adapter other than in-line L will equal L_w plus L_a (See figure 1-21.)

NOTE

Refer to TM 55-1500-204-25/1 for torque values.

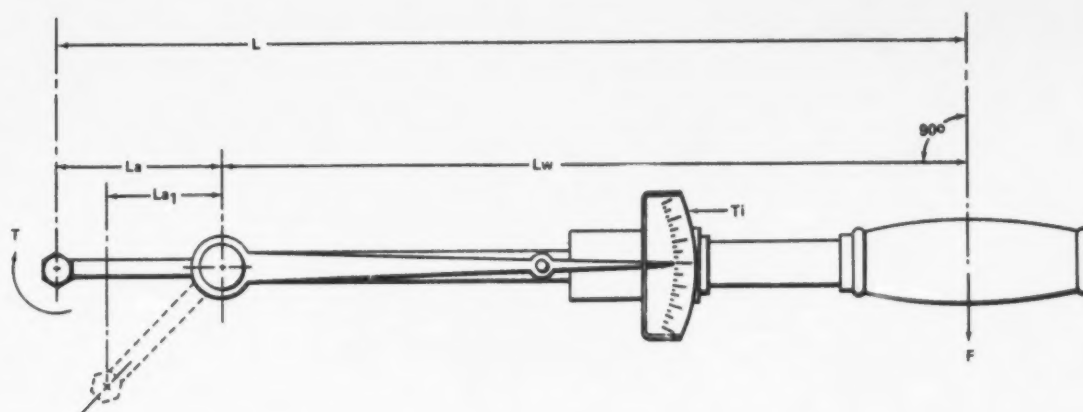


Figure 1-21. Use of torque wrench adapter

Table 1-8. List of consumable materials (sheet 1 of 3)

ITEM NO.	NOMENCLATURE	SPECIFICATION
1	Gasoline, Aviation	MIL-G-5572
2	Lubricating Oil, Aircraft Reciprocating Engine	MIL-L-6082
3	Hydraulic Fluid, Petroleum Base, Aircraft, Missile and Ordnance	MIL-H-5606
4	Isopropyl Alcohol	TT-I-735
5	Oxygen, Technical, Gas and Liquid	MIL-O-272108 Type I
6	Dry Cleaning Solvent	P-S-661
7	Corrosion Preventive, Fingerprint Remover	MIL-C-15074
8	Corrosion Preventive, Aircraft Engine	MIL-C-6529
9	Barrier Material, Greaseproofed, Waterproofed, Flexible	MIL-B-121
10	Anti-icing and Deicing-Defrosting Fluid	MIL-A-8243
11	Battery Water	O-B-41
12	Cornstarch, Technical Boiler Water Filtration	MIL-C-21963
13	Ammonium Hydroxide	MS 36032
14	Soap, Automobile and Floor, Liquid and Paste	P-S-560
15	Detergent, Synthetic, Anionic, Alkyl Benzene Sulfonate	MIL-D-26937
16	Naphtha, Aliphatic	TT-N-95
17	Wax, Aircraft, Waterproof, Solvent Type	MIL-W-18723
18	Kerosene	VV-K-211
19	Cleaning Compound, Aircraft Surface Alkaline Water-base	MIL-C-25769
20	Sodium, Bicarbonate, Technical	O-S-576
21	Lacquer, Spraying, Acid Resistant for Aluminum Surfaces Around Storage Batteries	TT-L-54
22	Deleted	
23	Soap, Laundry, Low-Titer, for Low Temperature Washing	P-S-600
24	Methyl-Ethyl-Ketone, for Use in Organic Coating	TT-M-261

Table 1-8. List of consumable materials (sheet 2 of 3)

ITEM NO.	NOMENCLATURE	SPECIFICATION
25	Cleaning Compound, Bridgeable	MIL-C-18687
26	Deodorant, Toilet, Cake	P-D-215
27	Tape, Pressure-Sensitive, Adhesive, Masking, Paper	UU-T-106
28	Aluminum Wool	MIL-A-4864
29	Alkyl Sulfonate	FSN 6550-240-2483
30	Corrosion Preventive Compound, Solvent Cutback, Cold-Application	MIL-C-16173
31	Cloth, Abrasive, Crocus	P-C-458
32	Hydraulic, Fluid, Petroleum Base, Preventive	MIL-H-6083
33	Lubricating, Oil, Jet Engine	MIL-L-6081
34	Corrosion Preventive Compound, Petrolatum, Hot Application	MIL-C-11796
35	Primer Coating Zinc Chromate, Low-Moisture-Sensitivity	MIL-P-8585
36	Coating Compound, Strippable, Sprayable	MIL-C-16555
37	Tape, Pressure Sensitive, Adhesive Packaging and Packing of	PPP-T-680
38	Coating, Sprayable, Strippable, Protective	MIL-C-6799
39	Grease, Graphite, Aircraft Lubricating	MIL-G-7187
40	Remover, Paint Organic Solvent Type	TT-R-251
41	Lacquer, Aluminized, Semipigmented, Brilliant	MIL-L-8641
42	Sealing Compound, Gasket, Hydrocarbon Fluid, Water Resistant	MIL-S-45180
43	Thread Compound, Anti-Seize and Sealing, Oxygen Systems	MIL-T-5542
44	Thread Compound, Anti-Seize, Graphite Petrolatum	MIL-T-5544
45	Antiseize Compound, White Lead Base General Purpose for Threaded Fittings	TT-A-580
46	Compound, Valve Grinding	SS-C-614
47	Soap Solution, Oxygen-System, Leak-Testing	MIL-S-4282
48	Deleted	
49	Cleaning Compound, Oxygen Systems	MIL-C-8638
50	Grease, Aircraft and Instrument, Gear and Actuator Screw	MIL-G-23827
51	Sealant, EC1020	FSN 8030-705-3033
52	Graphite, Lubricating, Flake	SS-G-659
53	Insulation Tape, Electrical, Pressure Sensitive Adhesive, Plastic	MIL-1-7798
54	AGISOLV 14 (or equivalent)	Branson Company
55	Lubricating Oil, General Purpose Low Temperature	MIL-L-7870
56	Sealant, EC576	FSC 76381
57	Sealant, EC755	MIL-S-2869
58	Sealing Compound, Integral Fuel Tanks and Fuel Cell Cavities, High Adhesion	MIL-S-7502
59	Compound, Lubricating, Inner Tube, Aircraft Tire	MIL-C-5024
60	Grease, Plug Valve, Gasoline and Oil Resistant	MIL-G-6032
61	Sulfuric Acid, Electrolyte, for Storage Batteries	O-S-801
62	Grease, Aircraft, General Purpose Wide Temperature Range	MIL-G-81322
63	Lubricating Oil, Internal	MIL-L-2104
64	Aluminum Alloy Alclad 2024	QQ-A-250/5
65	Compound, Metal Conditioner and Brightener	MIL-C-25378

Table 1-8. List of consumable materials (sheet 3 of 3)

ITEM NO.	NOMENCLATURE	SPECIFICATION
66	Chromium Trioxide	0-C-303
67	Trichlorethylene, Technical	0-T-634
68	Tetrachloroethylene, Technical Grade	0-T-236
69	Freon Gas, Compound	BB-F-671
70	Lubricant, Scintilla Cam Follower	FSN 9150-698-2381
71	Trichloroethylene, Stabilized Degreasing	MIL-T-7003
72	Insulating and Sealing Compound, Electrical	MIL-I-8660
73	Toluene, Technical	TT-T-548
74	Primer, Bostik 1007	FSC 70707
75	Cement EC870	MIL-A-5092 Type II
76	Cement EC1836	FSC 76381
77	Sealing Compound	MIL-S-7916
78	Shellac, Orange Gum, White Bleached, Refined Bleached	MIL-S-20526
79	Lubricating Oil, General Purpose	MIL-L-15016
80	Solder, Tin Alloy	QQ-S-571
81	Dow Corning Compound No. 7	FSC 71984
82	Lubriplate, 630AAA	FSN 9150-527-1752
83	Molybdenum Disulfide Powder, Lubricant	MIL-M-7866
84	Lubricant, Solid Film	MIL-L-23398
85	Antiseize Compound (high temperature)	MIL-A-907C
86	Antiseize Compound (high temperature)	Fel-Pro C-100
87	Sealant, EC1675	FSN 8030-616-9167
88	Sealing, Locking and Retaining Compounds, Single-Component	MIL-S-22473
89	Tape, Aircraft Tubing Identification Marker, Non/corrosive, Heat and Solvent Resistant	MIL-T-9906
90	Cleaning Compound, Solvent, Oil-Cooler	MIL-C-6864
91	Joy, Detergent, Liquid Cleaner	NSN 7930-00-764-5066
92	Adhesive EC1357	FED MMM-A-121

Table 1-9. Applicable FSC classes for consumable materials

NAME	FSC	NAME	FSC
Abrasives - Grain, Cloth, Paper	5350	Inspection Penetrant Kit	6850
Acid	6810	Inspection Penetrant Remover	6850
Adhesives	8040	Insulating Compound, Electrical	5970
Aluminum Wood	5350		
Anti-icing Fluid	6850	Layout Dye	6850
Antiseize Compounds	8030	Lubricating Oil	9150
Bags	8105	Paint Remover & Thinner	8010
Beeswax	9160	Paraffin	9160
		Petrolatum	9150
Carbon Removing Compound	6850	Plastic Molding Materials & Compounds	9330
Castor Oil	9160	Plexiglass Repair Kit	1560
Cement	8040	Polishing Cloths	7920
Chemicals	6810	Polishing Compounds	7930
Cleaning Cloths	7920	Preservative Compounds	8030
Cleaning Compounds	6850	Primer - Coating & Paint	8010
Cleaning Compounds	7930		
Corrosion Preventives	6850	Rags, Wiping	7920
Corrosion Removing Compounds	6850		
		Sacks	8105
Deodorant, General Purpose	6840	Sealing Compounds	8030
Desiccant	6850	Soap, Tiolet	8520
Detergent	7930	Solder	3439
Distilled Water	6810		
Dopes	8010	Tape, Electrical	5970
Dry Cleaning Solvent	6850	Tape, Identification	7890
Dyes	6820	Tape, Luminous & Reflective	9390
		Tape, Paper, Acetate Fiber & Gummed	8135
Fiberglass Repair Kit	1560	Tape, Pressure Sensitive Adhesive	7510
Fuel Oils	9140	Tape, Rubber, Adhesive & Cloth Coated	9320
		Towels - Paper & Machinery Wiping	7920
Gases - Compressed & Liquefied	6830		
Graphite	9620	Varnish	8010
Greases	9150	Varnish, Electrical Insulating	5970
Hydraulic Fluid	9150	Walkways Compounds, Nonslip	5610
Inhibitors	6850	Water Repellant Kit	6850
Ink	7510	Wax, Microcrystalline	9160

CHAPTER 2

LUBRICATION INSTRUCTIONS

SECTION I GENERAL LUBRICATION REQUIREMENTS

2-1. AIRCRAFT LUBRICATION.

2-2. The use of recommended lubricants is essential to proper maintenance of the U-8 aircraft. Absolute cleanliness is also a necessity. Maximum use and longer life for all moving parts will result if these two programs are utilized. The following paragraphs will cover, in detail, the lubrication points, time intervals, and proper lubrication methods for the aircraft.

2-3. LUBRICATION FREQUENCIES.

2-4. Lubrication frequencies may be increased to meet local and climatic conditions. This will ensure longer life to moving parts by keeping accumulations such as dust, dirt, or sand from entering crevices, grooves, etc.

2-5. LUBRICATION PRECAUTIONS AND PROCEDURES.

2-6. The following paragraphs give precautions and procedures that should be followed to provide maximum durability. Supplementary data on lubrication of oil-lubricated and grease-lubricated bearings, including cleaning, precautions and lubricating procedures, are given in TM 55-1500-204-25/1.

2-7. GREASE GUN APPLICATION.

2-8. Care must be taken when lubricating bearings and bearing surfaces with a grease gun to ensure that gun is filled with new, clean grease of the grade specified for the particular application before applying lubricant to the grease fittings.

2-9. OIL CAN APPLICATION.

2-10. A controllable-type squirt can is recommended for this type of application. After oil

is applied, wipe oil spillage from the area surrounding the bearing surfaces.

2-11. DUST, DIRT, OR SAND ACCUMULATION.

2-12. Dust, dirt, or sand combined with grease, oil, or graphite form an abrasive compound; therefore, it is important to remove excess lubricant from all moving parts subject to extremely dusty conditions. In prolonged dusty operating conditions, dust or dirt accumulations in grease fittings and bearing surfaces can be minimized by reducing the lubrication period to meet the local operating conditions.

2-13. CORROSION.

2-14. To reduce the possibility of corrosion in the aircraft structure, keep drainage holes clear. Moving parts that are normally exposed to condensation and water should always be well protected by lubricant.

2-15. GREASE FITTINGS.

2-16. Grease fittings throughout the aircraft are of the Alemite type, suitable for use with a hand or air-operated grease gun. When applying lubricant to grease fittings (with the exception of the propeller assembly), the grease should be forced through until new grease appears at part being lubricated.

NOTE

Grease fittings should always be cleaned before applying fresh grease.

2-17. BEARINGS.

2-18. Cleaning of bearings should be accomplished in accordance with TM 55-1500-204-25/1. Lubricate all bearings, except sealed bearings, in accordance with figure 2-1.

SECTION II LUBRICATION CHARTS

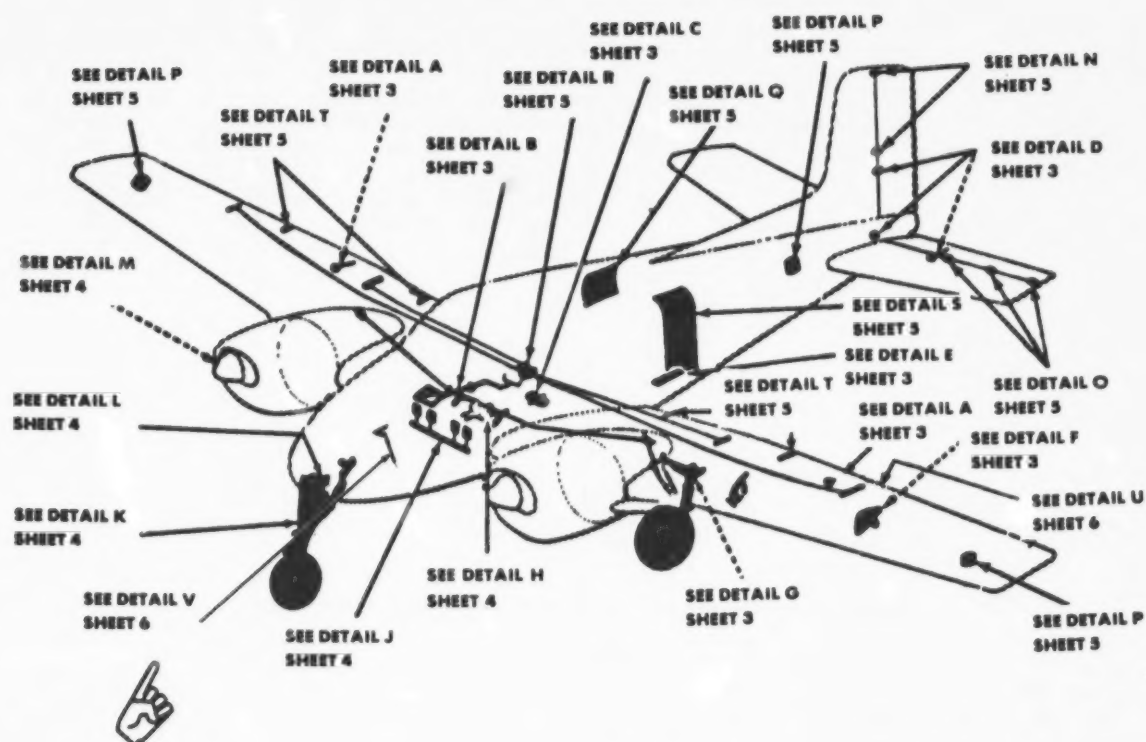
2-19. GENERAL.

2-20. The lubrication chart (figure 2-1) covers all lubrication points on the U-8 aircraft. Sheets 1 and 2 is the basic lubrication chart for the aircraft. Sheets 3 thru 5 cover specific lubrication points for the propellers, alighting gear, and control surfaces.

2-21. LUBRICATION REQUIREMENTS.

2-22. Each part to be lubricated, as depicted

on figure 2-1, is indicated by a frequency symbol which shows the time interval between lubrications. Application symbols within the frequency symbols show how the lubricant is applied. A parts nomenclature key, referred to by a number adjacent to the frequency symbol, identifies the part to be lubricated. A letter code within the frequency symbol identifies the type of lubricant. Parts or areas to be lubricated on both sides of the aircraft are indicated by broken leader lines. All symbols and codes are explained on sheet 2 of the lubrication chart.



1. FITTINGS - CLEAN FITTINGS BEFORE LUBRICATING. LUBRICATE THRU FITTINGS UNTIL NEW CREASE APPEARS AT THE PART BEING LUBRICATED.
2. PIANO TYPE HINGES - CARE SHOULD BE TAKEN TO REMOVE ALL EXCESS LUBRICANT AFTER LUBRICATING, AS IT WILL ACCUMULATE DIRT AND SAND AND CAUSE UNDUE WEAR.
3. CONTROL SYSTEM BEARINGS - KEEP ALL CONTROL BEARINGS WIPED CLEAN.
4. WHEEL BEARINGS - CLEAN WITH SOLVENT, FEDERAL SPECIFICATION P-D-680, AND RELUBRICATE AFTER EVERY AIRCRAFT WASHING, WHEEL REMOVAL, OR WHEN THE BEARINGS HAVE BEEN EXPOSED TO AN ABNORMAL QUANTITY OF MOISTURE OR SOLVENT.
5. USE OF MOLYBDENUM DISULFIDE POWDER - MIX POWDERED MOLYBDENUM DISULFIDE WITH NAPHTHA AND APPLY WITH BRUSH.
6. PROPELLER - LUBRICATE EACH BLADE EQUALLY WITH MAXIMUM OF 3 SHOTS PER BLADE.

Figure 2-1. Lubrication Chart (Sheet 1 of 6)






GREASE GUN OIL CAN BRUSH HAND

TABLE OF LUBRICANTS		
IDENTIFICATION LETTER	SPECIFICATION	TYPE OF LUBRICANT
G-354	MIL-G-23827	GREASE, AIRCRAFT AND INSTRUMENT
G-395	MIL-G-81322	GREASE, AIRCRAFT CENTRAL PURPOSE WIDE TEMPERATURE RANGE
O-001	MIL-L-7870	LUBRICATING OIL, GENERAL PURPOSE
S-740	MIL-M-7866	MOLYBDENUM DISULFIDE POWDER, LUBRICANT
O-190	V V-L-800	LUBRICATING OIL, GENERAL PURPOSE
S-749	MIL-L-23398	LUBRICANT, SOLID FILM
G-353	MIL-G-21164	GREASE MOLYBDENUM DISULFIDE, LUBRICANT
F-001	DC550R	TRANSDUCER FLUID (SILICONE)
O-155	MIL-O-6086	LUBOIL (GRADE M)
GS-02	MIL-M-7866 TT-N-75	MIX MOLYBDENUM DISULFIDE WITH NAPHTHA INTO A PASTE

NOMENCLATURE KEY

- | | | |
|--|--|--|
| 1. AILERON TAB ACTUATOR | 22. INNER AND OUTER BEARINGS | 41. NOSE AND MAIN GEAR RETRACT ACTUATOR SUPPORT BEARINGS |
| 2. CONTROL COLUMN (U-8D, U-8G, AND RU-8D) | 23. INNER AND OUTER BEARINGS. LANDING GEAR TORQUE TUBE BRACKET | 42. LANDING GEAR RETRACT ACTUATOR JACKSCREW |
| 3. CONTROL COLUMN CHAIN AND SPROCKETS (U-8F) | 24. LANDING GEAR EMERGENCY EXTENSION DRIVE | 42A. NOSE GEAR AND MAIN GEAR RETRACT ACTUATOR |
| 4. AILERON CONTROL QUADRANT | 25. LANDING GEAR EMERGENCY EXTENSION HANDLE PIN | 43. RUDDER HINGE BEARING |
| 5. RUDDER TRIM TAB ACTUATOR | 26. LANDING GEAR DISENGAGING LEVER | 44. ELEVATOR HINGE BEARING |
| 6. RUDDER TRIM TAB LINKAGE | 27. LANDING GEAR LIMIT SWITCH SCREW | 45. DE-ICER DISTRIBUTOR VALVE |
| 7. RUDDER TRIM TAB HINGE PIN | 27A. LANDING GEAR MOTOR SPLINE AND SPUR DRIVE GEAR | 46. EMERGENCY EXIT WINDOW MECHANISM |
| 8. ELEVATOR TRIM TAB HINGE PIN | 28. RUDDER PEDALS AND RUDDER BELLCRANK | 47. FLAP ACTUATING SYSTEM |
| 8. ELEVATOR TRIM TAB LINKAGE | 29. NOSE LANDING GEAR SUSPENSION POINTS | 48. CABIN COMPARTMENT DOOR (U-8G, U-8F) |
| 10. ELEVATOR TRIM TAB ACTUATOR | 30. NOSE LANDING DOOR LINKAGE AND HINGES | 49. FLAP TRACK AND ROLLER |
| 11. STEP RETRACT LEVER (U-8D) | 31. NOSE LANDING GEAR STEERING LINKAGE IDLER | 50. AILERON TRIM TAB ACTUATING ROD END |
| 12. STEP SLIDE TUBE (U-8D) | 32. NOSE LANDING GEAR LIFT LEG | 51. AILERON TRIM TAB HINGE CHAIN TRANSFER DRIVE SHAFT BEARINGS |
| 13. STEP SLIDE CHAIN (U-8D) | 33. NOSE LANDING GEAR BRACE BEARING | 53. IDLER SPROCKET BEARINGS |
| 14. AILERON BELLCRANK | 34. NOSE LANDING GEAR WHEEL BEARING | |
| 15. MAIN LANDING GEAR DOOR ACTUATING LINKAGE | 35. NOSE LANDING GEAR TORQUE KNEE | |
| 16. MAIN LANDING GEAR SUSPENSION POINTS | 36. NOSE WHEEL SHIMMY DAMPER ATTACHING POINTS | |
| 17. MAIN LANDING GEAR TORQUE KNEE | 37. NOSE WHEEL STEERING LINKAGE | |
| 18. MAIN LANDING GEAR WHEEL BEARINGS | 38. PROPELLER | |
| 19. MAIN LANDING GEAR LIFT LEG | 39. NOSE LANDING GEAR DOWN LOCK MECHANISM ATTACHMENTS | |
| 20. LANDING GEAR CLUTCH FINGERS | 40. MAIN LANDING GEAR DOWN LOCK MECHANISM, ATTACHMENTS | |
| 21. NOSE LANDING GEAR RETRACT CHAIN | | |

Figure 2-1. Lubrication Chart (Sheet 2 of 6)

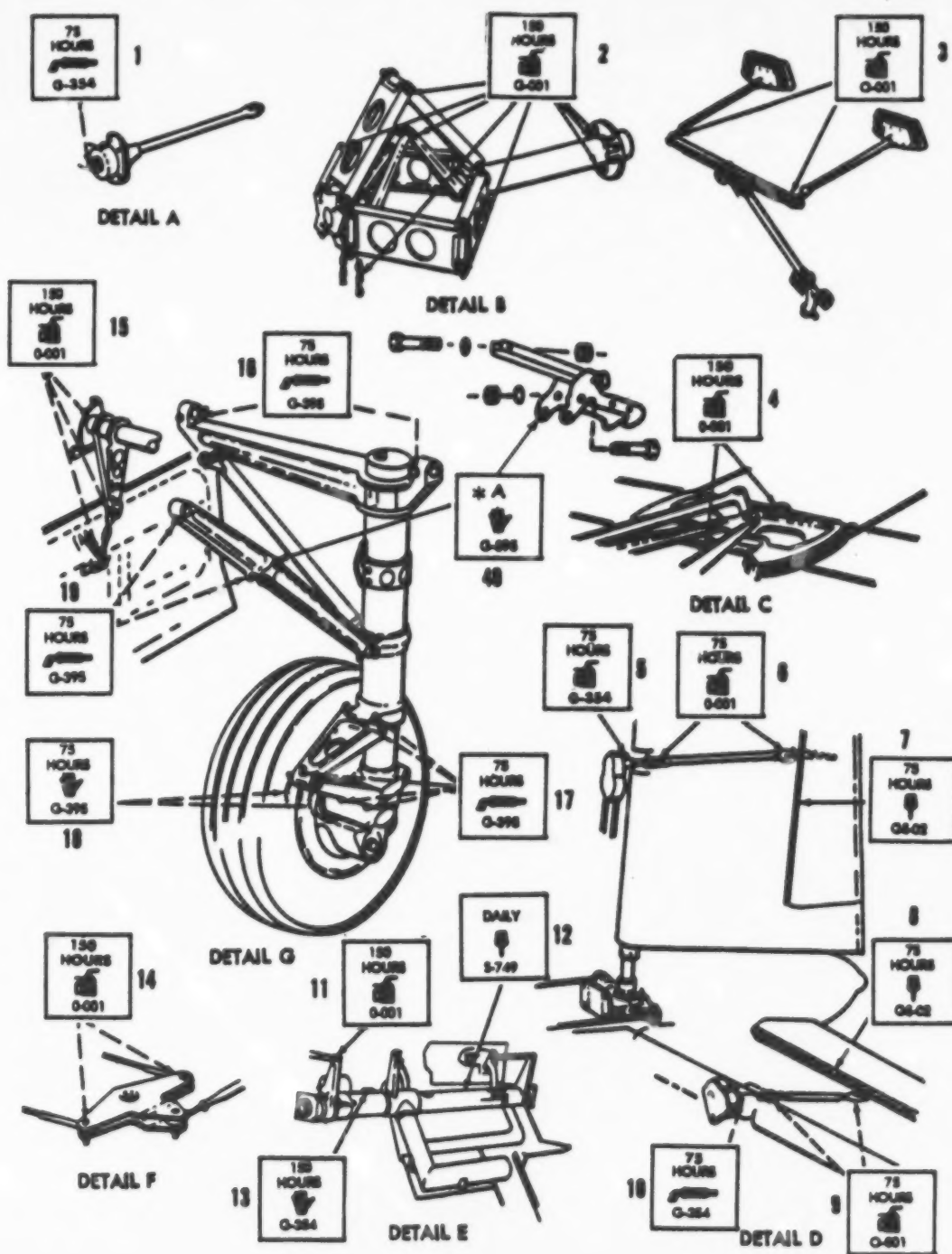


Figure 2-1. Lubrication Chart (Sheet 3 of 6)

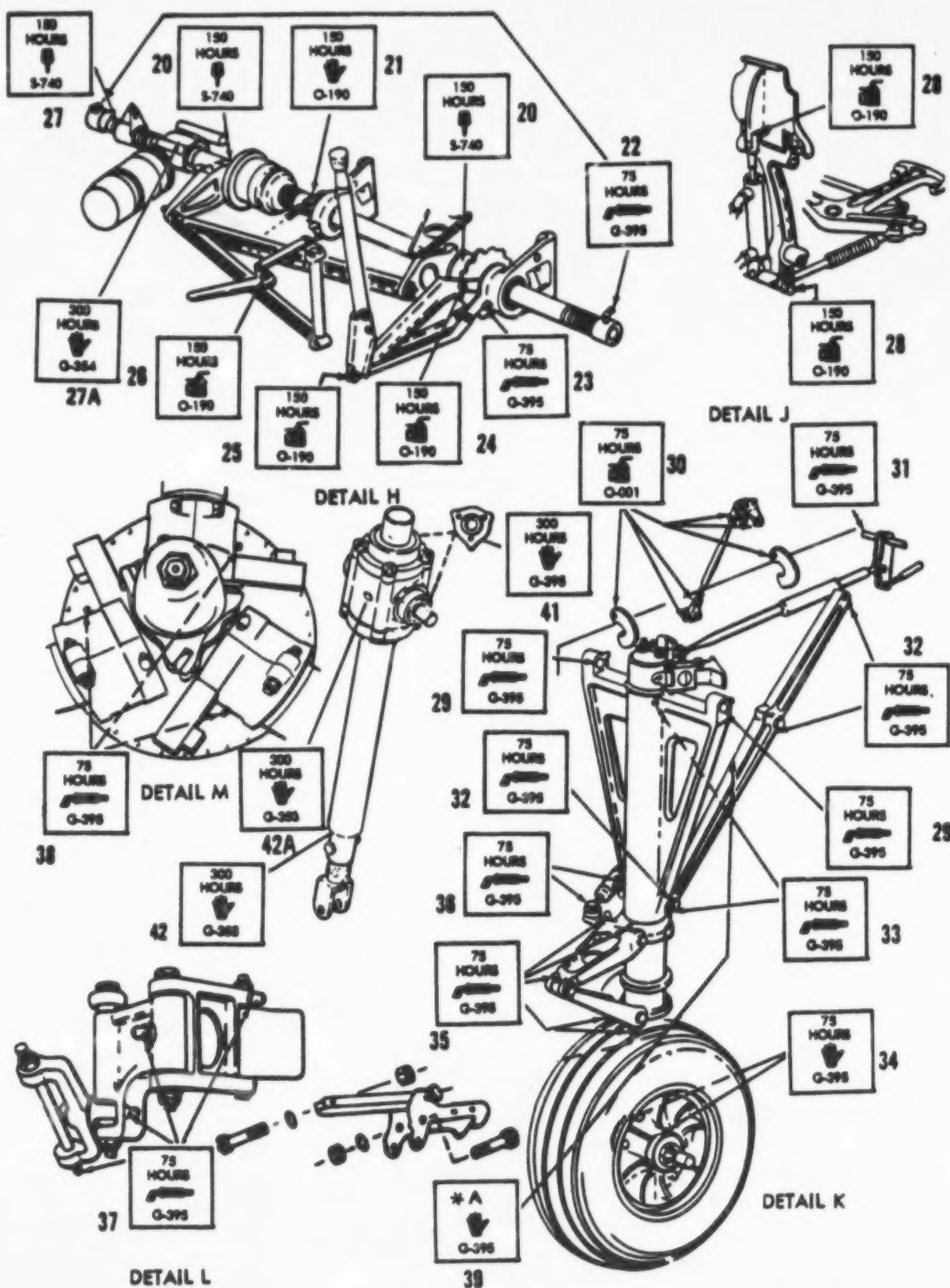


Figure 2-1. Lubrication Chart (Sheet 4 of 6)

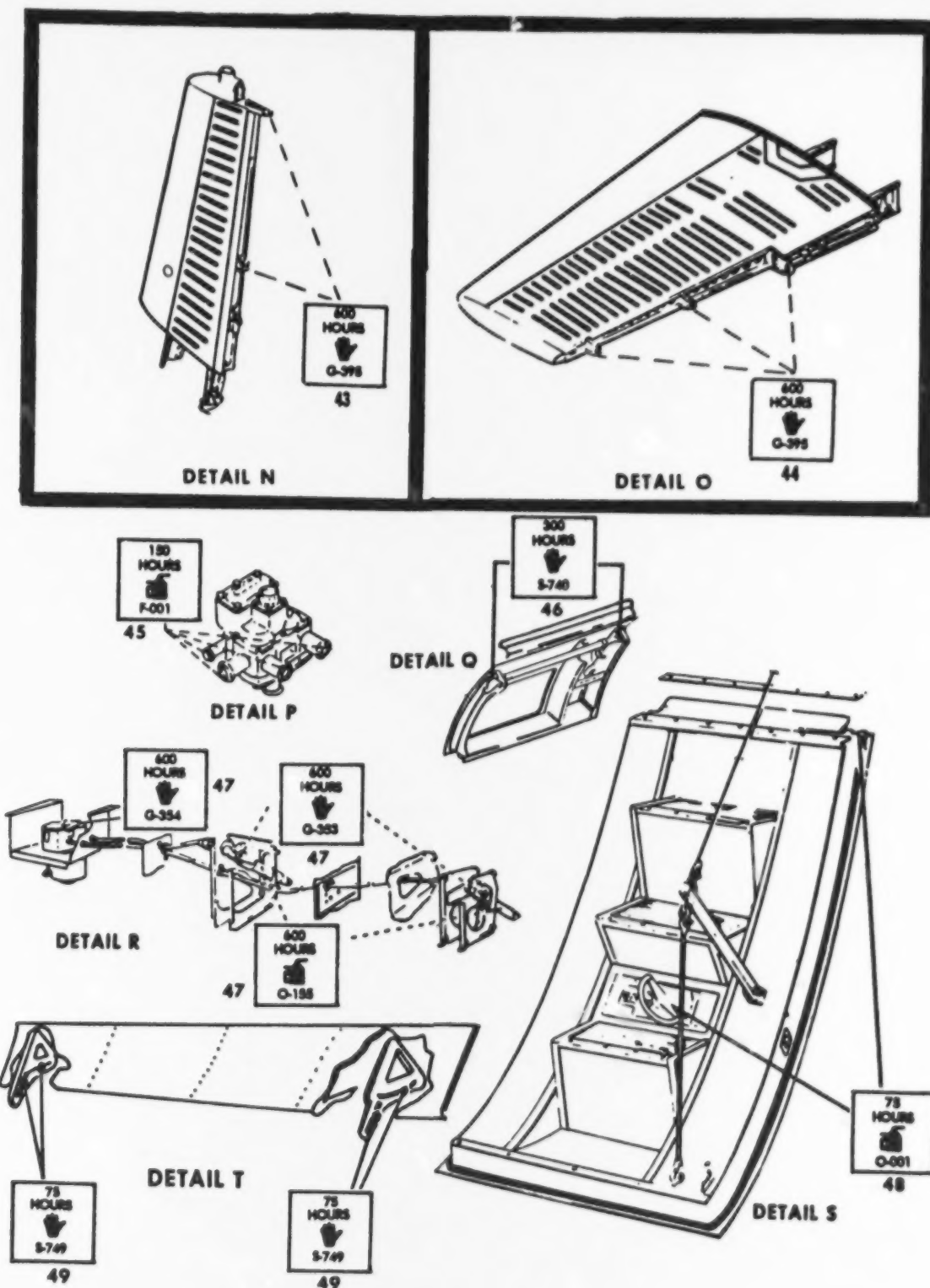
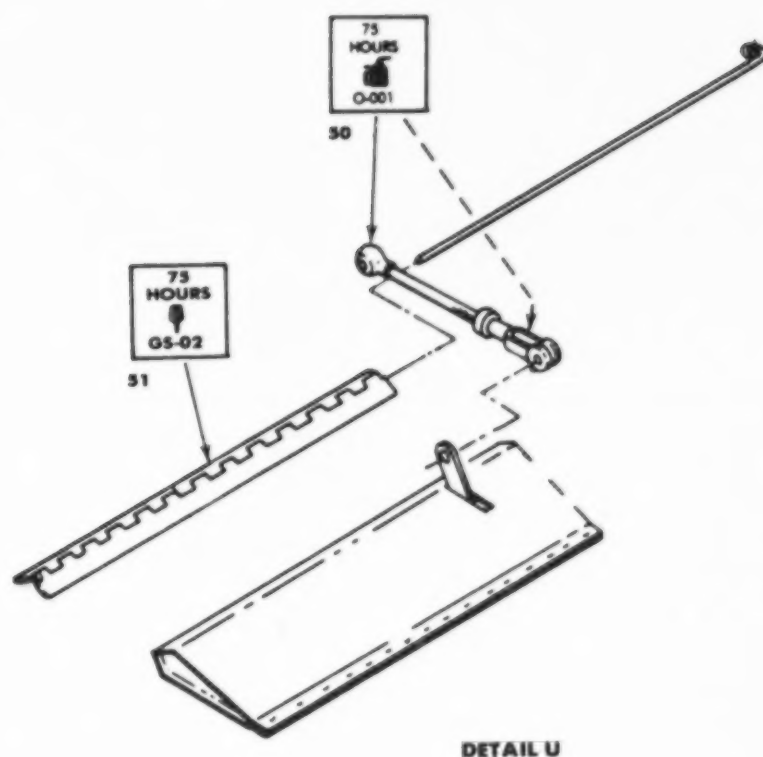
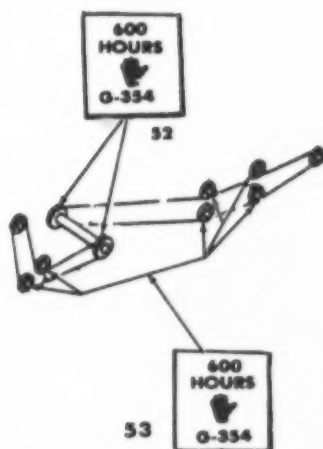


Figure 2-1. Lubrication Chart (Sheet 5 of 6)



DETAIL U



DETAIL V

Figure 2-1. Lubrication Chart (Sheet 6 of 6)

CHAPTER 3

INSPECTION REQUIREMENTS

SECTION I GENERAL INFORMATION AND SCOPE

3-1. GENERAL INFORMATION.

3-2. This chapter contains complete requirements for special inspections, test flight, overhaul and retirement schedule, and standards of serviceability applicable to the aircraft. Equipment serviceability criteria applicable to the U-8 aircraft are presented in TM 55-1510-201-ESC. It does not contain instructions for repair, adjustment, or other means of rectifying conditions, nor does it contain instructions for troubleshooting to find causes for malfunctioning. Applicable chapters covering the appropriate systems and higher echelon assistance should be consulted for instructions that are beyond the scope of this chapter.

3-3. SCOPE.

3-4. The inspections prescribed in this chapter will be accomplished at specified periods by organizational maintenance activities with the assistance of direct support activities when required. The following conditions will be noted during the performance of these inspections.

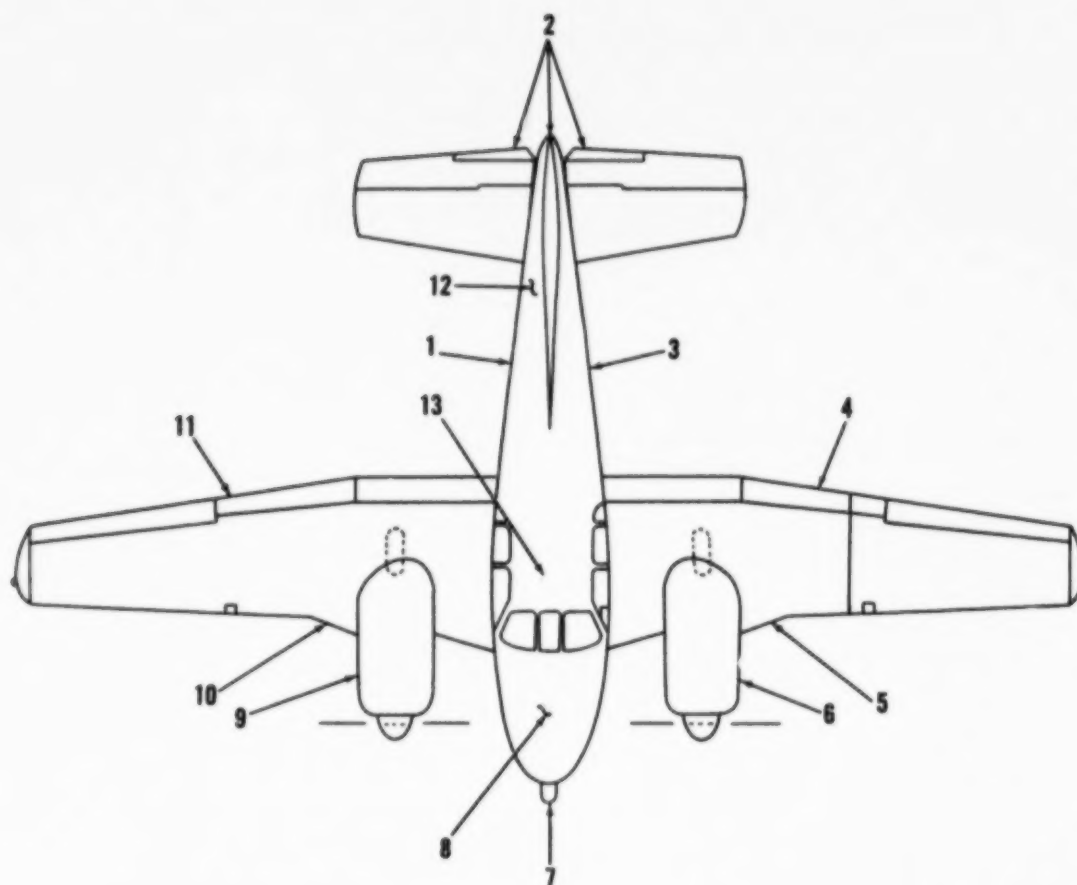
a. The inspection requirements are stated in such a manner as to establish what and when certain equipment is to be inspected and the condition to be sought. Compliance with the provisions outlined herein and with the Preventive Maintenance Inspection Checklists (TM 55-1510-201-20PMD, -20PMI, and -20PMP) are

required in order to assure that latent defects are discovered and corrected before malfunctioning or serious trouble results. In order to arrange inspection requirements as nearly as possible according to the manner in which work will be assigned, the requirements in each section are divided into groups under area headings. (See figure 3-1.) This figure will be the same as the area diagram presented in the appropriate Preventive Maintenance Inspection Checklist. An area title indicates a specific aircraft location which may be comprised of several system or groups of related components within this given area.

b. Inspection methods employed; environmental and geographical conditions; availability of specialized, skilled, or semi-skilled manpower; and facilities utilized are extremely variable; therefore, flexibility is provided with respect to the order of performance of the various inspections as required by efficient management of the inspection function assuring that the inspection requirements designated are adhered to and accomplished.

c. This manual pertains to all U-8 aircraft and may therefore contain inspection requirements applicable to specific equipment not installed on individual aircraft. When this situation is encountered, those requirements that are not applicable should be disregarded.

d. The inspection requirements contained herein are printed in inspection check-sheets which will be locally reproduced and utilized while performing the respective inspection.



AREA NUMBER	LOCATION	AREA NUMBER	LOCATION
1	FUSELAGE RH	8	NOSE SECTION
2	EMPENNAGE	9	NACELLE RH
3	FUSELAGE LH	10	MAIN LANDING GEAR WHEEL WELL RH
4	WING LH	11	WING RH
5	MAIN LANDING GEAR WHEEL WELL LH	12	FUSELAGE AFT SECTION INTERIOR
6	NACELLE LH	13	FLIGHT COMPARTMENT AND CABIN
7	NOSE LANDING GEAR WHEEL WELL		

Figure 3-1. Area Diagram

SECTION II SPECIAL INSPECTION

3-5. DEFINITION AND GENERAL INFORMATION.

3-6. This section supplements the scheduled inspections as outlined in the Preventive Maintenance Inspection Checklists in TM 55-1510-201-20PMD, -20PMI, and-PMP to include inspection of items which are required to be inspected at intervals not compatible with airframe operating time or airframe inspection intervals.

3-7. INSPECTION OF ITEMS.

3-8. Typical of this type inspection items are:

a. Inspection which is contingent upon specific conditions or incidents that arise, and only because of these conditions or incidents, immediate inspection is required to ensure further safe flight; such as, hard landings, overspeed, sudden stoppage, etc.

b. Inspection of components or airframe, on a calendar basis; such as, safety belts, first aid kits, weight and balance check, aircraft inventory, etc. This type inspection will be accomplished during the nearest intermediate or periodic inspection.

c. Specific definitive inspections on aircraft engines based strictly upon engine operating time.

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 1	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
6 and 9	AT EACH SPARK PLUG CHANGE AND WHEN ANY SPARK PLUG TERMINAL IS DISCONNECTED Inspect the following:	a. Elbows for distortion. b. Insulators (cigarettes) for missing or distorted contact springs, cracks, cleanliness, and secure attachment to end of ignition lead.		
5, 7, and 10	AFTER A HARD LANDING OR WHEN CIRCUMSTANCES WHICH COULD RESULT IN POSSIBLE LANDING GEAR DAMAGE ARE REPORTED BY FLIGHT CREW.	Accomplish the following: a. Remove tires from wheels and inspect for breaks. b. Check wheels for indication of cracks or distortion. c. Check landing gear components and areas of attachment for indications of cracks or distortion. d. Check landing gear and components for normal operation as follows: (1) Check landing gear for freedom of operation, and unusual noises. (2) Check limit, down lock position, warning, and safety switches for specified adjustment. (3) Check locking mechanism for positive engagement in extended position. Check clearance from up bumper stop. (4) Check position lights and warning horn for specified operation. (5) Check doors for freedom of operation and snug fit when closed. e. Check emergency extension system for freedom of operation and positive engagement of down locks.		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 2	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
5,7, and 10		WHEN ANY LANDING GEAR COMPONENT WHICH COULD AFFECT LANDING GEAR EXTENSION OR RETRACTION IS REPLACED OR ADJUSTED Accomplish the following: a. Check landing gear and components for normal operation as follows: (1) Check landing gear for freedom of operation and unusual noises. (2) Check limit, down lock position, warning, and safety switches for specified adjustment. (3) Check locking mechanism for positive engagement in extended position. Check clearance from up bumper stop. (4) Check position lights and warning horn for specified operation. (5) Check doors for freedom of operation and snug fit when closed. b. Check emergency extension system for freedom of operation and positive engagement of down locks.		
6 and 9		AFTER ENGINE OVERSPEED/OVERBOOST NOT IN EXCESS OF LIMITS SPECIFIED IN TM 55-1510-201-10/4 or TM 55-1510-201-10/5. Accomplish the following: a. Check engine for cracked or broken cylinder head or barrels. b. Perform cylinder compression test. c. Borescope cylinders for corrosion, pitting, and cracks. (See page 10 for instructions.) d. Inspect chip detector and filter element. e. Drain oil from system and check thoroughly for metal particles. f. When inspection of the engine discloses no visible damage as a result of overspeeding or overboost, the aircraft will be restricted to local flights and flown on a circled red X status for a period of 10 hours.		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 3	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
6 and 9		10TH HOUR OF OPERATION FOLLOWING INSPECTION DUE TO OVERSPEED/OVERBOOST Accomplish the following: a. Check oil filter, oil screen, and drain oil from system. b. Check for metal particles. c. When final inspection proves negative the aircraft will be unconditionally released for normal flight.		
6 and 9		25TH HOUR OF OPERATION AFTER INSTALLATION OF NEW, REBUILT, OR OVERHAULED ENGINE Accomplish the following: a. Drain oil from system. b. Replace filter element. c. Remove magnetic chip detector and check for metal particles. d. Flush oil cooler (see paragraph 5-140).		
6 and 9		AFTER ENGINE OPERATION IN EXCESS OF LIMITS SPECIFIED IN TM 55-1510-201-10/4 or TM 55-1510-201-10/5 Accomplish the following: a. Remove engine and tag for overspeed/overboost overhaul. b. Disassemble propeller, and inspect for damage (overspeed condition). Engine overspeed beyond 3750 rpm, tag propeller for overhaul. c. Check steel parts magnetically for cracks.		
6 and 9		EVERY ENGINE CHANGE Accomplish the following: a. Dye penetrant inspect engine mounts for cracks. b. Magnetic particle inspect engine mount bolts and sandwich mount bolts. c. Check cable and fittings for indications of cracking, corrosion, or misalignment, and for evidence of wear; check holes for elongation, and attaching bolts for wear.		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 3A	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIREMENT EVERY	ITEM	STA-TUS	RECORDED ON WORKSHEET
6 and 9	d.	Check anti-friction bearings (in bellcrank, control pulley, guide, and hinge) for roughness, corrosion, contamination, deterioration, deteriorated seals, misalignment, evidence of wear or lack of lubricant and security of installation.		
		EVERY ENGINE CHANGE AS A RESULT OF INTERNAL ENGINE FAILURE Accomplish the following and accomplish the preceding inspection for EVERY ENGINE CHANGE .		
	a.	Condemn oil cooler after internal engine failure.		
	b.	Disassemble, inspect, and flush propeller governor.		
	c.	Disassemble, inspect, and flush propeller assembly.		
	d.	Remove and clean oil tank (refer to paragraph 5-21).		
	e.	Flush component oil lines and hoses.		
	f.	Check the oil screen for contamination and clean. Change the injector pump if screen is damaged.		
13		25 HOURS OR EVERY 7 DAYS (WHICHEVER COMES FIRST)		
		Check voltage regulator setting: adjust for temperature as required. (TM 55-1510-201-20, Chapter 12, Section II) Carbon pile regulator.		
5, 7 and 10		DELETED		
13		100 HOURS OR EVERY 120 DAYS (WHICHEVER OCCURS FIRST)		
		Check solid state voltage regulator setting: adjust for temperature as required (TM 55-1500-204-25/1).		
6 and 9		EVERY ENGINE CHANGE AS A RESULT OF SUDDEN STOPPAGE PERFORM THE FOLLOWING ACCESSORIES CHECK		
		Visually inspect for damage and perform functional or operational check.		
6 and 9		AFTER GROUND RUN AND FIRST FLIGHT FOLLOWING ENGINE OR CYLINDER CHANGE Inspect the following:		
		Chip detector, oil filter, and oil pump screen for metal particles.		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 3B	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
6 and 9		EVERY 1200 HOURS OF ENGINE OPERATION OR EVERY GENERATOR REMOVAL. Perform following inspection: a. Engine-mounted generator spline for wear. b. External splines of generator drive shaft for wear. c. Generator external drive shaft for discoloration. d. Armature for binding, rubbing, and unusual noises, by turning shaft assembly. e. Commutator for loose or missing commutator bars. f. Commutator for grooves, pitting, and burned commutator bars. g. Undercutting depth between the commutator bars. h. Generator brushes for wear.		
All Areas		WHENEVER THE AIRCRAFT STRUCTURE IS STRUCK BY LIGHTNING a. Inspect the fuselage interior and exterior, wing surfaces, landing gear and wheel wells, flight surfaces, horizontal and vertical stabilizer surfaces, propellers, and engine nacelles for burn marks, cracks, pitting, or other signs of high temperature stress, to determine the lightning entry and exit points. b. Trace the path of the lightning strike to the extent possible, using a magnetometer. c. Check the magnetic compass for accuracy (the degree of inaccuracy may serve as an indicator of the severity of the strike). d. Inspect wiring in tunnel areas and exposed areas for burns. e. Inspect antennas for burns and pitting. f. Inspect all electrically operated components and lighting systems for damage. g. Inspect communications and navigation equipment for damage.		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 3C	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIRE- MENT EVERY	ITEM	STA- TUS	RECORDED ON WORKSHEET
6 and 8		h. If the preceding steps a through g reveal major damage has occurred, proceed as follows: (1) Bench test all avionics and electrical systems and components. (2) Perform a megger check and continuity check on all wiring and cables. (3) Perform a Voltage Standing Wave Ratio (VSWR) check on all antennas, antenna cables, and connectors. i. If the preceding steps a through g reveal that only minor damage has occurred, omit step h. j. Perform a ground run operational check on the aircraft, functionally check the flight control system, and all avionics, electrical, lighting, communication, and navigation systems. k. Repair any damage and replace damaged components as required, using standard maintenance practices.		
		WHENEVER A PROPELLER HAS BEEN STRUCK BY LIGHTNING a. Perform preceding steps a thru k. b. Remove and label the propeller as having been struck by lightning, and forward to depot for disposition. c. Remove and label the engine as having possible lightning strike damage, and forward to depot for disposition.		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 4	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8, U-8G, RU-8D, U-8F		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIREMENT EVERY	ITEM	STA-TUS	RECORDED ON WORKSHEET
6 and 9		AFTER EACH PROPELLER CONTROL LINKAGE ADJUSTMENT OF GOVERNOR OR PROPELLER INSTALLATION OR REINSTALLATION Feather propeller through one cycle.		
6 and 9		AFTER FIRST 15 MINUTES OF ENGINE OPERATION FOLLOWING INSTALLATION OF PROPELLER GOVERNOR Retighten governor retaining nuts to proper torque.		
6 and 9		AFTER INSTALLATION OF PROPELLER ACCOMPLISH THE FOLLOWING a. After first fifteen minutes of engine ground operation, visually check bulk-head for slippage. b. After test flight, loosen propeller retention nut approximately 1/4 turn, re-tighten to a torque of 450 foot-pounds.		
1		FIRST INTERMEDIATE INSPECTION AFTER INSTALLATION OF FUSELAGE STEP OR STEP RETRACT CHAIN (U-8D) Check step retract chain for proper tension.		
6 and 9		WHEN AIRCRAFT IS REMOVED FROM STORAGE Inspect engine driven fuel pump body and relief valve housing assembly bolts for proper torque.		
4 and 11		WHEN OUTBOARD WING IS REMOVED Inspect in accordance with TM 55-1510-201-35 paragraph 4-106d.		
4 and 11		100 HOURS AFTER INSTALLATION OF WING ATTACHING BOLTS Check wing attaching bolts for specified torque.		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 5	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIREMENT EVERY	ITEM	STA-TUS	RECORDED ON WORKSHEET
13	EVERY	ENGINE CHANGE AND ANY TIME THAT EQUIPMENT REPLACEMENT, RELOCATION, OR MODIFICATION MIGHT RESULT IN COMPASS DEVIATION Check magnetic compass indicator for a correct reading on all cardinal headings. If necessary, recompensate compass.		
13	UPON ANY CHANGE OF ELECTRICAL EQUIPMENT OR MAJOR STRUCTURAL CHANGES LIKELY TO AFFECT THE COMPASS; UPON 12 MONTHS ELAPSED TIME SINCE LAST INSPECTION OF MAGNETIC STANDBY COMPASS.	Check magnetic standby compass for discoloration of liquid and proper calibration. Recompensate if necessary. (Refer to TM 55-1500-204-25/1.)		
	EVERY 12 MONTHS	Check remote indicating compass for accuracy; compensate if necessary. (Refer to TM 55-1500-204-25/1, paragraph 3-301g and TM 11-4920-292-15). (Time period begins at installation date.)		
All Areas	WHEN AVAILABLE INFORMATION INDICATES EXPOSURE TO RADIOACTIVITY Accomplish the following:	a. Survey aircraft for level of radioactivity. b. Decontaminate aircraft as required.		
All Areas	UPON TRANSFER AND UPON RECEIPT OF AN AIRCRAFT; UPON EXPIRATION OF 12 MONTHS ELAPSED TIME SINCE LAST INVENTORY; AND UPON PLACING AIRCRAFT IN STORAGE, AND UPON REMOVING FROM STORAGE; (Aircraft need not be inventoried while in storage)	Inventory aircraft for availability of inventoriable property. (Refer to DA Form 2408-17 and Appendix C.)		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 6	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
All Areas		AFTER INSTALLATION, REMOVAL, OR RELOCATION OF EQUIPMENT AND/OR MAJOR MODIFICATION WHICH RESULTS IN AN UNKNOWN CHANGE IN BASIC WEIGHT AND BALANCE. AFTER REPORT OF UNSATISFACTORY FLIGHT CHARACTERISTICS. Weigh aircraft and accomplish necessary entries in Handbook of Weight and Balance Data, in accordance with criteria in AR 95-16.		
All Areas	EVERY 30 MONTHS	Weigh aircraft and accomplish necessary entries in Handbook of Weight and Balance in accordance with criteria in AR 95-16.		
All Areas	EVERY 6 MONTHS	Inspect portable fire extinguisher in accordance with TM 55-1500-204-25/1. Inspect and test grounding receptacles. Refer to TM 55-1500-204-25/1.		
12	EVERY 24 MONTHS	Turn in first aid kits for inspection in accordance with TM 55-1500-328-25.		
All Areas	EVERY 12 MONTHS	a. Pitot Static System - Inspect and test per TM 55-1500-204-25/1. b. Manifold Pressure Gauge - Inspect and test per TM 55-1510-201-35. (Compute calendar time from date stamped on instrument case). c. Tachometer - Inspect and test per TM 55-1500-204-25/1 GS level. (Compute calendar time from date stamped on instrument case).		
13	EVERY 12 MONTHS OR 600 FLIGHT HOURS	Inspect seat channels, tracks, and locking pins for wear beyond dimensional limits.		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 7	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIREMENT EVERY	ITEM	STATUS	RECORDED ON WORKSHEET
13	EVERY 24 MONTHS	a. Altimeter - Inspect and test per TM 55-1500-204-25/1 GS level. (Compute calendar time from date stamped on instrument case). b. Airspeed Indicator - Inspect and test per TM 55-1500-204-25/1 GS level. (Compute calendar time from date stamped on instrument). c. Inspect outside air temperature gauge in accordance with TM 55-1500-204-25/1.		
	EVERY 60 MONTHS	Hydrostatically test oxygen cylinder. NOTE Initial change date shall be stenciled on new or newly tested bottles and DA Form 2408-18 shall be annotated to show hydrostatic test due date five years hence.		
4 and 11		EVERY 48 MONTHS OR 1200 FLIGHT HOURS REMOVE AILERONS AND PERFORM INTERIOR INSPECTION FOR CORROSION AND SPAR CRACKS		
All Areas		WHEN SPECIAL INSPECTION ITEMS BECOME DUE AND ARE PERFORMED AND APPLICABLE FORMS, RECORDS AND WORK SHEETS PERTAINING THERETO WILL BE COMPLETED AND UPDATED AS REQUIRED (TM 38-750)		
6		EVERY 30 DAYS OR 25 FLIGHT-HOURS (WHICHEVER OCCURS FIRST)		
		Perform preventative maintenance checks and services of the NICAD batteries in accordance with TM 11-6140-203-14-2.		
6 and 9		EVERY 120 DAYS OR 100 FLIGHT HOURS (WHICHEVER OCCURS FIRST)		
		Battery capacity check due (lead-acid battery) in accordance with TB 11-6140-219-35/1.		
		Remove battery (NICAD) (in accordance with Chapter 12) from aircraft for preventative maintenance and services in accordance with TM 11-6140-203-14-2.		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 7A	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIRE- MENT EVERY	ITEM	STA- TUS	RECORDED ON WORKSHEET
All Areas		WHEN PILOT HAS MADE A REPORT DENOTING AIRCRAFT HAS BEEN SUBJECTED TO SEVERE TURBULENCE DURING FLIGHT OR UNUSUAL FLIGHT ATTITUDES, INSPECT AIRFRAME AND COMPONENTS FOR THE FOLLOWING: a. Wing and center section skins for buckles, tears, cracks, and loose, tilted, sheared, or missing rivets. b. Accessible portions of spars and ribs for buckles, cracks, and loose, tilted, or sheared rivets, bolts, and nuts. c. Accessible portions of root rib for evidence of failure. d. Wing leading edge for evidence of failure. e. Fuselage skins and accessible internal structure for cracks, fractures, buckles, tears, and loose, tilted, or sheared rivets, bolts and nuts. f. Vertical stabilizer skin and accessible internal structure for buckles, cracks, tears, fractures, loose screws, loose or sheared rivets, fittings and attachment points for looseness or evidence of failure. g. Perform a trammeling check of the A/C. h. Wing local areas that provide support for external store attachments and float tank pedestals, visually for cracks, distortion, skin wrinkles, loose, tilted, sheared, or missing fasteners, fittings and attachment points for looseness or evidence of failure, main spar and ribs for damage.		

AIRCRAFT INSPECTION CHECKSHEET		TYPE OF INSP (Daily, Intermediate, etc) SPECIAL	PAGE NO. 8	NO. PAGES 8
AIRCRAFT AND SERIAL NO. U-8D, U-8F, U-8G, RU-8D		INSPECTION NO.	DATE OF INSPECTION	
AREA NO.	REQUIREMENT EVERY	ITEM	STA-TUS	RECORDED ON WORKSHEET
All Areas		WHEN PILOT HAS MADE A REPORT DENOTING AIRCRAFT HAS BEEN SUBJECTED TO SEVERE TURBULENCE OR UNUSUAL ATTITUDES DURING FLIGHT, OR FLAPS HAVE BEEN LOWERED ABOVE PLACARD SPEED. INSPECT ALL FIXED AND MOVEABLE FLIGHT CONTROLS FOR THE FOLLOWING: a. Fittings and attachment points for looseness or evidence of failure. b. Skins, fabric surfaces, and accessible internal structures for cracks, fractures, distortion, wrinkles, loose or sheared rivets, bolts, and nuts. c. All controls, controlling parts, and mechanisms for excessive play, binding and proper rigging during operational check.		
All Areas		WHEN PILOT HAS MADE REPORT THAT LANDING GEAR HAS BEEN LOWERED ABOVE PLACARD SPEED, INSPECT LANDING GEAR SYSTEM AS FOLLOWS: a. Landing gear components and area of attachment thoroughly inspected for cracks, distortion, and security. b. Landing gear operation and mechanism inspected for: (1) Wear, cracks, distortion, galling, operation and security. (2) Positive engagement of locking mechanism in retracted and extended position.		
All Areas		WHEN PILOT HAS MADE A REPORT DENOTING AIRCRAFT HAS BEEN SUBJECTED TO SEVERE TURBULENCE DURING FLIGHT, INSPECT ENGINES FOR THE FOLLOWING: a. Cowling for cracks, distortion, buckles, wrinkles, loose or missing rivets, and fasteners. b. Engine mounts visually for cracks, distortion and evidence of failure; sheared bolts and nuts. c. Vibration isolators (if applicable) for unbonding, distortion, damage, and security.		

SECTION III TEST FLIGHT

3-9. DEFINITION AND GENERAL INFORMATION.

3-10. This section contains test flight inspection requirements peculiar to U-8 aircraft. Conditions requiring accomplishment of test flight shall be in accordance with TM 55-1500-328-25 and changes thereto. The requirements herein are established to assure a thorough inspection of the aircraft before flight, during flight, and upon completion of test flight. When a test flight is performed for the purpose of determining if specific equipment or systems are in proper operating condition, requirements not related to such equipment or systems should be disregarded.

3-11. TEST FLIGHT INSPECTION CHECK-SHEETS.

3-12. The test flight inspection checksheets are presented in a format for local reproduction. Continuation sheets shall be used when necessary for each part. Explanation of the checksheets is as follows:

- | | |
|----------|---|
| Block 1 | Aircraft Model and Series |
| Block 2 | Complete Aircraft Serial Number |
| Block 3 | Organizational Unit Performing Test |
| Block 4 | Day, Month, and Year |
| Block 5 | Reason test flight is being performed |
| Block 6 | Numerical Inspection ITEM Identification Number |
| Block 7 | Inspection Requirements Arranged in Chronological Order |
| Block 8 | Instrument Minimum and Maximum Operating Ranges |
| Block 9 | Actual Indication Entered at Time of Test Flight |
| Block 10 | Enter satisfactory or unsatisfactory symbol (as shown in note) at time of test flight. All unsatisfactory symbols will be explained in remarks (Test Flight Checksheet, Part IV). |

3-13. Additional information, relative to recording of inspection on applicable forms and the use of this manual, may be obtained by consulting applicable technical directives that are listed in Appendix A.

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I - GROUND CHECK				PAGE NO. 1	NO. PAGES 3
1. TYPE ACFT U-8D, U-8G, U-8F and RU-8D	2. SERIAL NO.	3. ORGANIZATION	4. DATE	5. PURPOSE OF TEST FLIGHT	
NOTE: Symbol for Block 10-() Satisfactory(X) Unsatisfactory (Explain in Remarks)					
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE		9. ACTUAL INDICATION	10. LEGEND (See note)
		MIN	MAX		
1	Aircraft forms inspected.				
2	Daily inspection completed.				
3	Flight readiness check completed.				
4	Pre-engine start check completed.				
5	Start and warm up engines (see Note). No. 1 (U-8D, U-8G and RU-8D) (U-8F)	1300 800	1500 1200		
	No. 2 (U-8D, U-8G, and RU-8D) (U-8F)	1300 800	1500 1200		
	NOTE U-8D, U-8G, and RU-8D. Warmup engines at 800 to 1200 RPM until oil pressure has sta- bilized and all temperatures show a definite increase.				
6	Check engine oil pressure (psi). (U-8D, U-8G and No. 1 RU-8D) No. 2	25 25	85 85		
7	Check engine oil pressure (psi). (U-8F) No. 1 No. 2	35 35	85 85		
8	Check cylinder head temperature. (U-8D, U-8G, RU-8D No. 1 and U-8F) No. 2	121°C 121°C	246°C 246°C		
9	Check engine oil temperature. (U-8D, U-8G, RU-8D No. 1 and U-8F) No. 2	38°C 38°C	113°C 113°C		
10	Fuel pressure with/without boost pumps (psi) (U-8D, U-8G, and RU-8D) (U-8F)	9 6	15 20		
11	Electrical circuit operation (battery only).				
12	Electrical circuit operation (generator only).				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I - GROUND CHECK (CONTINUED)				PAGE NO. 2	NO. PAGES 3
1. TYPE ACFT U-8D, U-8G, U-8F and RU-8D	2. SERIAL NO.	3. ORGANIZATION	4. DATE	5. PURPOSE OF TEST FLIGHT	
NOTE: Symbol for Block 10- () Satisfactory(X) Unsatisfactory (Explain in Remarks)					
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE		9. ACTUAL INDICATION	10. LEGEND (See note)
		MIN	MAX		
13	VHF and/or UHF receiver and trans- mitter (operation).				
14	Low frequency receiver (operation).				
15	Altimeter setting.				
16	Barometric pressure verified with control tower.				
17	Fuel feed from each tank.				
18	Idle mixture check at 600 rpm (U-8D, U-8G and RU-8D)				
	(rpm rise) No. 1		+5-10		
	(rpm rise) No. 2		+5-10		
19	Magneto switch OFF momentarily. No. 1 No. 2				
20	Perform ignition system check. (rpm drop) No. 1				
	L mag		-125		
	R mag		-125		
	No. 2				
	L mag		-125		
	R mag		-125		
21	Static rpm check. (Power check) No. 1 No. 2				
	With propeller in full low pitch, slowly ad- vance the throttle until the manifold pressure reading is equivalent to the barometric pressure indicated by the manifold pressure gauge (prior to starting the engine). With this manifold pressure reading, the tach- ometer should indicate 2900 ± 100 RPM. En- gine should respond smoothly without coughing, backfiring or roughness during power check.				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART I - GROUND CHECK (CONTINUED)				PAGE NO. 3	NO. PAGES 3
1. TYPE ACFT U-8D, U-8G, U-8F and RU-8D	2. SERIAL NO.	3. ORGANIZATION	4. DATE	5. PURPOSE OF TEST FLIGHT	
NOTE: Symbol for Block 10- () Satisfactory(X) Unsatisfactory (Explain in Remarks)					
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE		9. ACTUAL INDICATION	10. LEGEND (See note)
		MIN	MAX		
	NOTE The variations of ± 100 rpm is to compensate for unpredictable atmospheric conditions which may cause above tolerances to be exceeded even though propeller-engine combination is operating satisfactorily. However, during an engine power check, both engines should indicate approximately the same rpm.				
22	Propeller control check at 2600 rpm, full pitch. (rpm drop) No. 1 No. 2	-200 -200	-250 -250		
23	Propeller feathering, check at 1500 rpm. (rpm drop) No. 1 No. 2		-500 -500		
24	Alternate engine air check for slight drop in manifold pressure at 1500 rpm (U-8F). No. 1 No. 2				
25	Carburetor heat for slight drop in manifold pressure gage and for slight temperature rise at 1500 rpm (U-8D, U-8G, and RU-8D). No. 1 No. 2				
26	Idle rpm. No. 1 No. 2 Idle rpm check U-8F No. 1 No. 2	600 600 700 700			
27	Steerable nose wheel action.				
28	Brakes operation.				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART II - INFLIGHT CHECK (CONTINUED)				PAGE NO. 2	NO. PAGES 5
1. TYPE ACFT U-8D, U-8G U-8F and RU-8D	2. SERIAL NO.	3. ORGANIZATION	4. DATE	5. PURPOSE OF TEST FLIGHT	
NOTE: Symbol for Block 10- () Satisfactory(X) Unsatisfactory (Explain in Remarks)					
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE		9. ACTUAL INDICATION	10. LEGEND (See note)
		MIN	MAX		
2	b. Check engine controls for alignment and proper response during power changes.				
	c. Check aircraft for control and stability.				
	d. Check filter air and ram air indicators (U-8F).				
	Cruise.				
	a. Check the following engine instruments for stability and for indications within normal operating limits:				
	(1) Check engine rpm				
	No. 1	2400	3200		
	No. 2	2400	3200		
	(2) Check manifold pressure.				
	No. 1	14Hg	45Hg		
	No. 2	14Hg	45Hg		
	(3) Check cylinder head temperature.				
	No. 1	121°C	246°C		
	No. 2	121°C	246°C		
(4) Check oil pressure (psi).					
No. 1	65	85			
No. 2	65	85			
(5) Check oil temperature.					
No. 1	38°C	113°C			
No. 2	38°C	113°C			
(6) Check fuel pressure (psi).					
No. 1 (U-8D, U-8G, and RU-8D)	11	15			
(U-8F)	11	20			
No. 2 (U-8D, U-8G, and RU-8D)	11	15			
(U-8F)	11	20			

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART II - INFLIGHT CHECK (CONTINUED)				PAGE NO. 3	NO. PAGES 5
1. TYPE ACFT U-8D, U-8G, U-8F and RU-8D	2. SERIAL NO.	3. ORGANIZATION	4. DATE	5. PURPOSE OF TEST FLIGHT	
NOTE: Symbol for Block 10-() Satisfactory(X) Unsatisfactory (Explain in Remarks)					
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE		9. ACTUAL INDICATION	10. LEGEND (See note)
		MIN	MAX		
	(7) Check carburetor air temperature (U-8D, U-8G, and RU-8D) No. 1 No. 2	49°C 49°C	74°C 74°C		
	(8) Vacuum (Hg) (U-8D, U-8G, RU-8D) (U-8F)	3.75 3.75	4.60 5.25		
	b. Check propeller for proper response to high and low pitch controls. Check for actuation and rotation stop by feathering.				
	c. Check for availability of fuel from all sources by checking engine operation in each fuel selector position.				
	d. Check generators and voltage regu- lator for output as follows:				
	(Volts) Ambient ground level temperature 80° F		27		
	(Volts) Ambient ground level temperature 32° and 80° F		28		
	(Volts) Ambient ground level temperature 32°F		28.5		

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART III - AFTER FLIGHT CHECK				PAGE NO. 3A	NO. PAGES 5
1. TYPE ACFT U-8D, U-8G, U-8F and RU-8D	2. SERIAL NO.	3. ORGANIZATION	4. DATE	5. PURPOSE OF TEST FLIGHT	
NOTE: Symbol for Block 10-()		Satisfactory(X)		Unsatisfactory (Explain in Remarks)	
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE		9. ACTUAL INDICATION	10. LEGEND (See note)
		MIN	MAX		
	e. Check cabin heater, ventilators, and defrosters for operation.				
	f. Check deicer system for specified pressure and operation. (psi)	12	17		
	g. Check the following flight instruments for indications corresponding to changes in temperature, pressure, direction, altitude, or attitude.				
	(1) Altimeter				
	(2) Airspeed indicator				
	(3) Magnetic compass				
	(4) Gyrosyn compass indicator.				
	(5) Vertical velocity indicator.				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART II - INFLIGHT CHECK (CONTINUED)				PAGE NO. 4	NO. PAGES 5
1. TYPE ACFT U-8D, U-8G, U-8F and RU-8D	2. SERIAL NO.	3. ORGANIZATION	4. DATE	5. PURPOSE OF TEST FLIGHT	
NOTE: Symbol for Block 10-()		Satisfactory(X)		Unsatisfactory (Explain in Remarks)	
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE		9. ACTUAL INDICATION	10. LEGEND (See note)
		MIN	MAX		
	(6) Attitude indicator				
	(7) Turn and slip indicator.				
	(8) Outside air temperature gage.				
	h. Test flight controls (ailerons, elevators, rudder, and trim tabs) for proper response and smooth and unrestricted movement during all flight maneuvers.				
	i. Test stall warning light and horn for correct indication and steady sound at specified air speed.				
	j. Test landing flaps for operation and proper position indication.				
	k. Test landing gear for operation and proper position indication (normal and emergency).				
	l. Test throttle warning horn for intermittent sound.				
	m. Test oxygen system for proper output consistent with altitude and regulator setting.				
	n. Test communication, navigation, and mission systems for the following:				
	(1) FM liaison set for proper operation.				
	(2) VHF command set system for operation.				
	(3) UHF command set system for operation.				
	(4) HF communication set for operation.				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART II - INFLIGHT CHECK (CONTINUED)				PAGE NO. 5	NO. PAGES 5
1. TYPE ACFT U-8D, U-8G, U-8F and RU-8D	2. SERIAL NO.	3. ORGANIZATION	4. DATE	5. PURPOSE OF TEST FLIGHT	
NOTE: Symbol for Block 10- ()		Satisfactory(X)		Unsatisfactory (Explain in Remarks)	
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE		9. ACTUAL INDICATION	10. LEGEND (See note)
		MIN	MAX		
	(5) Emergency VHF transmitter for proper operation.				
	(6) Omni radio for proper reception of VOR and VAR, range signal, and voice.				
	(7) Glide slope for proper operation.				
	(8) Marker beacon for proper reception.				
	(9) Automatic direction finder for proper reception of tone and voice, homing, and direction finding.				
	(10) Weather radar for proper operation.				
	(11) Transponder for proper operation.				
	(12) TACAN for proper operation.				
	(13) Voice security for proper operation.				
	(14) Radar beacon for proper operation.				
	(15) Missions equipment for proper operation.				
	(16) Doppler radar navigation system for proper operation.				
	(17) Gyro magnetic compass system for proper operation.				

AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART III - AFTER FLIGHT CHECK				PAGE NO. 1	NO. PAGES 1
1. TYPE ACFT U-8D, U-8G, U-8F and RU-8D	2. SERIAL NO.	3. ORGANIZATION	4. DATE	5. PURPOSE OF TEST FLIGHT	
NOTE: Symbol for Block 10-() Satisfactory(X) Unsatisfactory (Explain in Remarks)					
6. ITEM NO.	7. INSPECTION ITEMS	8. RANGE		9. ACTUAL INDICATION	10. LEGEND (See note)
		MIN	MAX		
1	Check wheel brakes for effectiveness.				
2	Accomplish engine operational checks in accordance with procedures prescribed in TM 55-1510-201-10/4 or TM 55-1510-201-10/5.				
3	Shut down engines in accordance with procedures prescribed in TM 55-1510-201-10/4 or TM 55-1510-201-10/5.				
4.	Visual inspection completed.				
5.	Record deficiencies and shortcomings noted on DA Form 2408-13 (Aircraft Inspection and Maintenance Record).				

6. ITEM NO.	AIRCRAFT TEST FLIGHT INSPECTION CHECKSHEET PART IV - REMARKS	PAGE NO.	NO. OF PAGES
TYPED OR PRINTED NAME OF PILOT		SIGNATURE	
TYPED OR PRINTED NAME OF OBSERVER		SIGNATURE	

SECTION IV OVERHAUL AND RETIREMENT SCHEDULE

3-14. SCOPE.

3-15. This section lists units of operating equipment that are to be overhauled or retired at the period specified. Removal of equipment for overhaul may be accomplished at the inspection nearest the time when overhaul is due unless otherwise specified in TB 55-1500-328-25. Upon replacement of items listed in this chapter all applicable forms, records and worksheets will be completed and updated as required (TM 38-750).

3-16. OVERHAUL INTERVAL.

3-17. The maximum authorized operating time of parts prior to removal for the overhaul at maintenance level authorized in accordance with

the Maintenance Allocation Chart.

3-18. RETIREMENT SCHEDULE.

3-19. The operating time specified for removal, condemnation, and disposal of parts in accordance with applicable directives.

WARNING

TM 55-1500-328-25 should be referred to concerning mutilation/destruction of items when they have reached the established life expectancy (finite life) before the items are forwarded for property disposal.

PART I

REPLACEMENT AND RETIREMENT SCHEDULE FOR U-8D, U-8G, AND RU-8D

AREA	OVERHAUL INTERVAL	RETIREMENT INTERVAL	ITEM AND PART NUMBER
6 and 9	2000 hours		Engine, 0-480-1 and 0-480-1A (0-480-1B, 2810-109-9578)
6 and 9	2000 hours		Propeller, HC93Z20-2C1-1051B8
13	18 months		Oxygen regulator, 8805
12 and 13		5 years	Seat belts and shoulder harness (nylon or dacron)
12 and 13		1 year	Replace airline safety belts (cotton)

PART II

REPLACEMENT AND RETIREMENT SCHEDULE FOR U-8F

6 and 9	2000 hours	Engine, 0-480-3 (0-480-3A)
6 and 9	2000 hours	Propeller, HC93Z20-2C1-10151B8
12	36 months	Oxygen regulator, A2000
		Seat belts and shoulder harness (nylon or dacron)
		Replace airline safety belts (cotton)

SECTION V STANDARDS OF SERVICEABILITY

3-20. PURPOSE.

3-21. This section provides a guide to all personnel engaged in the maintenance of Department of the Army aircraft in determining serviceability of aircraft.

3-22. MAINTENANCE FUNCTIONS AND INSPECTIONS.

3-23. The availability of serviceable aircraft is contingent upon effective maintenance management; therefore, the maximum utilization of available capabilities, faithful and timely performance of assigned maintenance functions, and conscientious performance of specified maintenance inspections augmented by careful supervision and strict quality control will enhance aircraft availability and serviceability.

3-24. STANDARDS OF SERVICEABILITY.

3-25. Serviceability can be determined only by actual inspection of the aircraft and can be determined at any time throughout the life cycle of the aircraft. Wear tolerance and maximum allowable deterioration, specified in maintenance and inspection requirements, have been designed to assure a high degree of serviceability, availability, and safety. These tolerances and limits are the basic standards for serviceability and are embodied in aircraft maintenance and inspection manuals; therefore, inspection for serviceability is performed during every maintenance inspection. Aircraft being transferred to CONUS, if beyond incountry capability to meet the required standards of serviceability, will be processed through a CONUS General Support Shop or Depot in order to

meet the Standards before issuance to CONUS unit. In this case, lowtime components may be removed from the aircraft before return to CONUS, but an identical item must accompany the aircraft. Components on hand at DS/GS level of maintenance, as prestocked time-change components for the specific aircraft, will accompany the aircraft at the time of transfer.

3-26. DEGREE OF SERVICEABILITY.

3-27. Transfer of aircraft generates administrative and technical problems for supply and maintenance management. To minimize the impact upon the receiving activity of a transferred aircraft, degrees of serviceability are established to supplement basic standards included in present maintenance and inspection requirements. The supplementary standards, contained in this section, have been designed to assure that sufficient reliable hours of flight are remaining on the aircraft, and components to satisfy immediate operational and logistical requirements of the receiving activity when the aircraft is being transferred within CONUS, overseas, or into combat operations.

3-28. The degree of serviceability required for aircraft upon completion of overhaul will be to the same degree required for transfer within CONUS; except when aircraft is predetermined to be destined for overseas or into combat, in which case the overhauled aircraft will conform to the standards of the specific transfer condition.

3-29. See TB AVN 23-8 and 23-67, AR 750-5 and AR 750-55 for other transfer criteria, evacuation assistance inspection procedures, and maintenance support.

STANDARDS OF SERVICEABILITY FOR ARMY AIRCRAFT

ITEM NO.	ITEM	DEGREE OF SERVICEABILITY REQUIRED FOR TRANSFER WITHIN THEATER OF OPERATIONS OR FROM AN OVERSEAS THEATER TO CONUS	DEGREE OF SERVICEABILITY REQUIRED FOR TRANSFER FROM ONE THEATER OF OPERATION TO ANOTHER THEATER OF OPERATIONS	DEGREE OF SERVICEABILITY REQUIRED FOR TRANSFER FROM A NONCOMBAT THEATER TO A COMBAT THEATER OF OPERATIONS
1.	INSPECTION	Perform next intermediate inspection when next periodic inspection is due within 25 operating hours, perform next periodic inspection.	Perform next periodic inspection.	Perform next most detailed periodic inspection. (e.g. 5th periodic requiring removal of wings or rotor heads, etc.)
2.	MODIFICATION	Accomplish all Urgent and normal MWO's TCTM and TB's required to perform next mission assignment.	Accomplish all urgent MWO & TCTM. Accomplish all Normal MWO & TCTM which have an issue date of 3 mos. prior to date of transfer and TB's required to perform next mission assignment.	Accomplish all urgent MWO's and TCTM's. Accomplish all normal MWO's & TCTM's which have an issue date of three (3) months prior to date of transfer when resources & time are available all normal MWO's & TCTM's will be accomplished before transfer. Accomplish TB's required to perform next mission assignment.
3.	MISSION ESSENTIAL EQUIPMENT	Assure mission essential equipment is installed.	Assure mission essential equipment is installed and is completely operational.	Assure mission essential equipment is installed and is completely operational.
4.	AIRCRAFT PAINT	Touch up by area spraying as necessary to provide a protective seal on all required surfaces and meet requirements of TB 746-93-2.	Touch up by area spraying as necessary to provide a protective seal on all required surfaces; completely repaint if condition of existing paint warrants. Paint necessary peculiar markings on aircraft required by the theater of operations and meet requirements of TB 746-93-2.	Touch up by area spraying as necessary to provide a protective seal on all required surfaces. Paint necessary peculiar markings on aircraft required by theater of operations and meet requirements of TB 746-93-2.

STANDARDS OF SERVICEABILITY FOR ARMY AIRCRAFT (CONT)

ITEM NO.	ITEM	DEGREE OF SERVICE-ABILITY REQUIRED FOR TRANSFER WITHIN THEATER OF OPERATIONS OR FROM AN OVERSEAS THEATER TO CONUS	DEGREE OF SERVICE-ABILITY REQUIRED FOR TRANSFER FROM ONE THEATER OF OPERATION TO ANOTHER THEATER OF OPERATIONS	DEGREE OF SERVICEABILITY REQUIRED FOR TRANSFER FROM A NONCOMBAT THEATER TO A COMBAT THEATER OF OPERATIONS
5.	COMPONENT REPLACEMENT			
	a. Items having a schedule replacement or retirement time below 500 hours.	Replace if less than 50 hours of schedule operating time remains.	Replace if less than 100 hours of schedule operating time remains.	Replace if less than 300 hours of schedule operating time remains.
	b. Items having a schedule retirement time over 500 hours	Replace if less than 10% or 100 hours of schedule operating time remains (which ever is least).	Replace if less than 25% or 200 hours of schedule operating time remains (which ever is least).	Replace if less than 300 hours of schedule operating time remains.
	c. Items having a schedule change based on calendar months.	Replace if less than one month remains before change is required after date of transfer. Transfer from an overseas theater to CONUS -- Replace if less than two months remain before change is required after date of transfer if components are available within theater.	Replace if less than two months remain before change is required after the date of transfer if components are available within theater.	Replace if less than four months remain before change is required after date of transfer.
6.	CONTROL CABLES			
	a. 7 x 7	Replace when more than three wires are broken or corroded within a one inch distance. When repaired at a depot activity, replace all frayed cables.	Replace when more than three wires are broken or corroded within a one foot distance. When repaired at a depot activity, replace all frayed cables.	Replace when more than three wires are broken or corroded within a two foot distance. When repaired at a depot activity, replace all frayed cables.
	b. 7 x 19	Replace when more than six wires are broken or corroded within a one inch distance.	Replace when more than six wires are broken or corroded within a one foot distance.	Replace when more than six wires are broken or corroded within a two foot distance.

STANDARDS OF SERVICEABILITY FOR ARMY AIRCRAFT (CONT)

		DEGREE OF SERVICE- ABILITY REQUIRED FOR TRANSFER WITHIN THE- ATER OF OPERATIONS OR FROM AN OVERSEAS THEATER TO CONUS	DEGREE OF SERVICE- ABILITY REQUIRED FOR TRANSFER FROM ONE THEATER OF OP- ERATION TO ANOTHER THEATER OF OPERA- TIONS	DEGREE OF SERV- ICEABILITY REQUIR- ED FOR TRANSFER FROM A NONCOM- BAT THEATER TO A COMBAT THEATER OF OPERATIONS
7.	TIRES	Replace if less than 25% of tread remains.	Replace if less than 50% of tread remains.	Replace if less than 75% of tread remains.
8.	COMMU- NICATIONS, COMPASS, ELECTRON- IC & NAVI- GATION EQUIPMENT	Assure equipment is complete and fully operational.	Assure type of equip- ment installed is com- patible to type and sys- tem utilized at destina- tion and equipment is fully operational.	Assure type of equip- ment installed is com- patible to type and sys- tem utilized at destina- tion and equipment is complete and fully operational.

CHAPTER 4 AIRFRAME AND ALIGHTING GEAR

SECTION I SCOPE

4-1. PURPOSE.

4-2. The purpose of this chapter is to provide all the essential information for maintenance personnel to accomplish organizational maintenance on the complete airframe and alighting gear to support each individual function required in other chapters of this manual.

4-3. DESCRIPTION.

4-4. The airframe of the U-8 aircraft is an all-metal, semimonocoque-type construction designed to fulfill light cargo and personnel transport missions. The airframe consists primarily of a fuselage section, empennage section, and wing section. The alighting gear

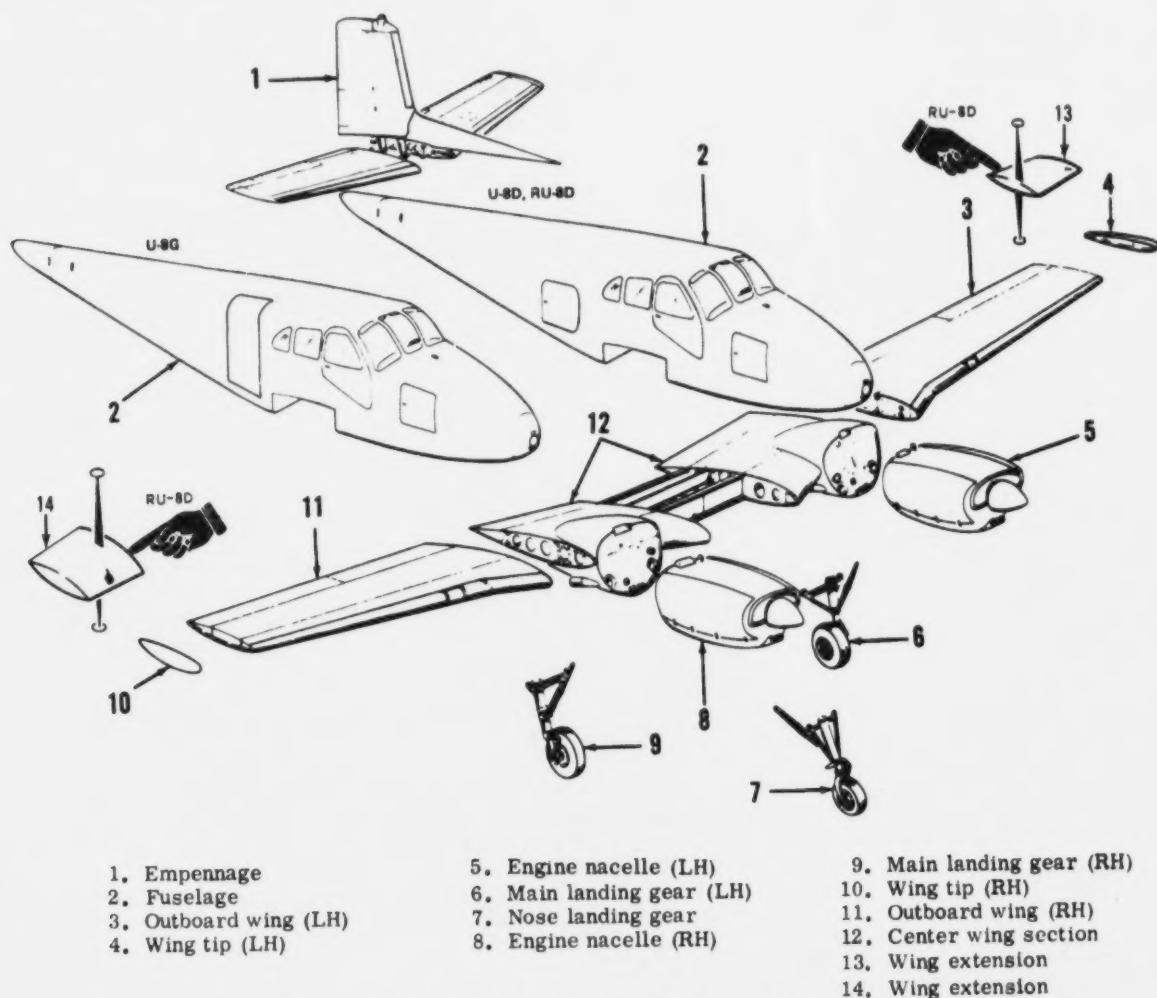


Figure 4-1. Exploded view of aircraft (U-8D, U-8G, and RU-8D)

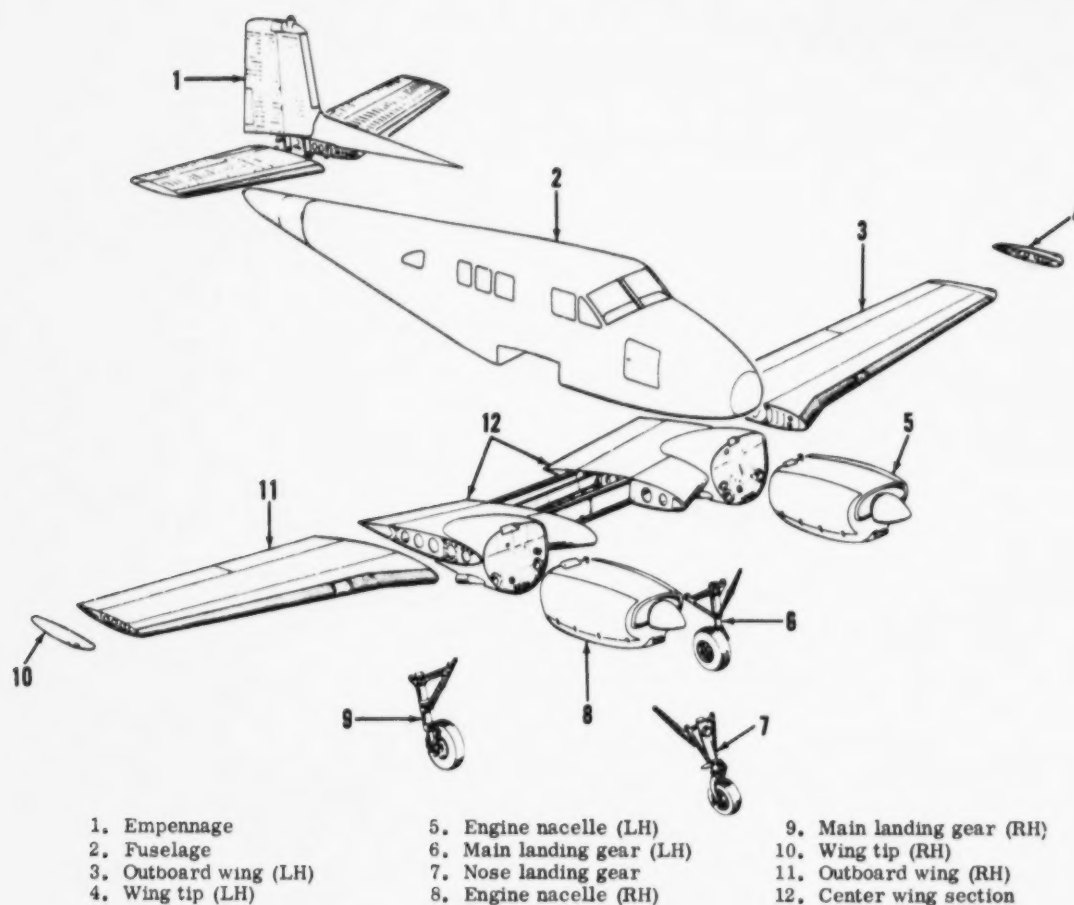


Figure 4-2. Exploded view of aircraft (U-8F)

consists of a retractable tricycle landing gear. (See figure 4-1 and 4-2.)

4-5. MAINTENANCE OF AIRFRAME SURFACES.

4-6. The maintenance of airframe surfaces requires a comprehensive program of preventive maintenance adapted to the specific operating conditions of the aircraft. Periodic cleaning, inspection, recognition and treatment of corrosion, and touchup of surfaces which have lost their protective coatings will prevent extensive structural repairs and add to frame life. Refer to TM 55-1500-204-25/1 for all cleaning and corrosion preventive procedures.

4-7. MAINTENANCE OF PLASTIC SURFACES.

4-8. Plastic surfaces will not corrode, but are highly susceptible to crazing, optical distortion, and scratches. Plastic surfaces shall be kept clean and maintained in accordance with TM 55-1500-204-25/1.

4-9. MAINTENANCE OF PLACARDS AND DECALS.

4-10. Placards and decals are located in various places on U-8 aircraft to supply operating information and to identify various aircraft components. Placards and decals shall be applied and maintained in accordance with TM 55-1500-204-25/1.

SECTION II FUSELAGE SECTION

4-11. DESCRIPTION.

4-12. The fuselage section consists of a nose cone (U-8D, U-8G, and RU-8D), radome (U-8F), nose equipment compartment, flight compartment, cabin compartment (U-8G and U-8F), baggage compartment, aft fuselage, and tail cone. (See figure 4-3, 4-4, and 4-5.)

4-13. NOSE CONE. (U-8D, U-8G, AND RU-8D)

4-14. The fiberglass nose cone contains a passing light mounted in a metal frame located in the center of the nose cone. The metal frame also forms a ram air intake for the heater air supply. The nose cone fits flush with the aircraft skin and is attached by screws around its perimeter.

a. Removal. (1) Place an indexing mark on nose cone and aircraft skin to assist in installation of nose cone, unless new nose cone is to be installed.

(2) Remove light retaining ring screws.

(3) Pull out light and disconnect electrical leads.

(4) Remove screws securing nose cone to aircraft.

(5) Remove nose cone from aircraft.

b. Cleaning. Clean nose cone in accordance with paragraph 1-159.

c. Inspection. Inspect for dents, cracks, or tears around mounting holes and air intake frame.

d. Installation. (1) When nose cone is to be reinstalled, proceed as follows:

(a) Align index mark on nose cone with index mark on aircraft.

(b) Secure nose cone to aircraft with screws.

(2) When a new nose cone is to be installed, proceed as follows:

(a) Position new nose cone for best fit, mark position, and scribe a trim line to conform with skin line.

(b) Remove nose cone and trim to fit.

(c) Locate and drill all mounting holes to align with existing nutplates.

(d) Countersink all holes 100 degrees.

(e) Secure nose cone to the aircraft with screws.

(f) Connect electrical leads to passing light.

(g) Install passing light and secure with light retaining ring and screws.

4-15. RADOME. (U-8F)

4-16. The fiberglass radome on U-8F aircraft provides maximum protection and accessibility for the radar antenna. The radome fits flush with the aircraft skin and is attached by screws around its perimeter.

a. Removal. (1) Place an indexing mark on radome and aircraft skin to assist in installation of radome, unless new radome is to be installed.

(2) Remove screws securing radome to aircraft.

(3) Gently pull radome from aircraft.

b. Cleaning. Clean radome in accordance with paragraph 1-161.

c. Inspection. Inspect for dents, cracks, or tears around mounting holes.

d. Installation. (1) When radome is to be reinstalled proceed as follows:

(a) Align index mark on radome with index mark on aircraft skin.

(b) Secure radome to aircraft with screws.

(2) When a new radome is to be installed, proceed as follows:

(a) Position new radome for best fit, mark position, and scribe a trim line to conform with skin line.

(b) Remove radome and trim to fit.

(c) Locate and drill all mounting holes to align with existing nutplates.

(d) Countersink all holes 100 degrees.

(e) Secure radome to aircraft with screws.

4-17. NOSE EQUIPMENT COMPARTMENT (U-8D, U-8G, RU-8D).

4-18. The nose equipment compartment is used for avionics component installation. Access to the equipment is gained through a door on the right hand side of the compartment. A microswitch, mounted on the door jamb and actuated by the door latch, completes the dome light circuit and de-energizes the engine primer and engine starting circuits when the door is open. The U-8D, U-8G, and RU-8D are also equipped with a panel on the left hand side of the nose equipment compartment for additional access to equipment located in the compartment. Screws around the outer edges of the panel and a seal provide maximum security for the compartment. Access to the heating and ventilating system in the U-8D, U-8G, and RU-8D is gained by removing a panel in the nose equipment compartment floor.

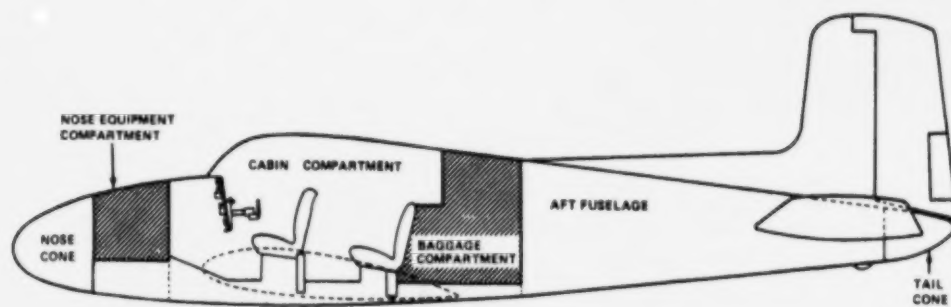


Figure 4-3. Compartment diagram (U-8D and RU-8D)

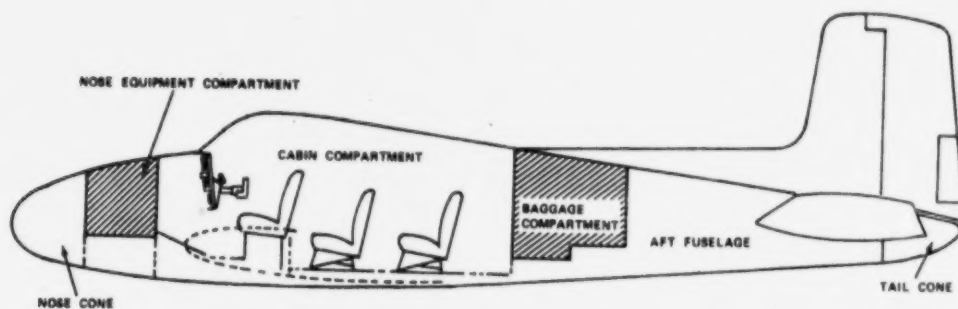


Figure 4-4. Compartment diagram (U-8G)

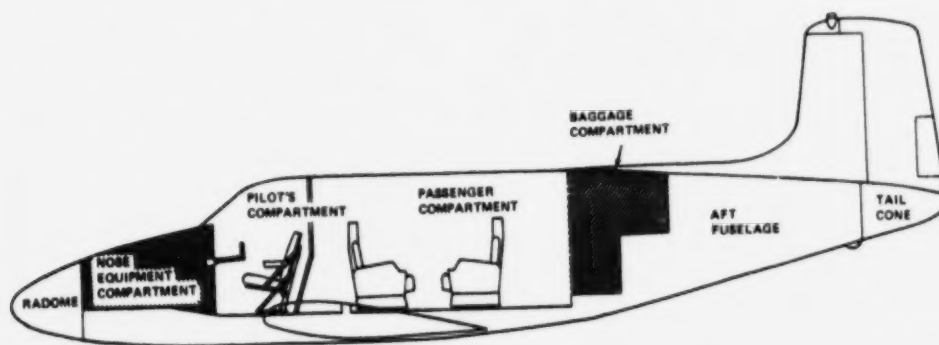


Figure 4-5. Compartment diagram (U-8F)

(2) Rotate latch handle (13) and withdraw latch handle and lock (15) from blade assembly (12).

(3) Remove screws (8) from latch cover (9) and remove latch cover.

(4) Remove screws (16) from plate assembly (11) and remove plate assembly (12).

b. Cleaning. Clean latch parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. (1) Inspect parts for cracks, bends, and stripped threads.

(2) Inspect mounting holes for cracks and elongations.

d. Installation. (1) Position blade assembly (12, figure 4-6) in plate assembly (11) and secure plate assembly to door (5) with screws (16).

(2) Install lock (15) through latch handle (13). Position latch handle (13) and secure with set-screw (14).

(3) Position latch cover (9) and secure with screws (8).

4-22. NOSE EQUIPMENT COMPARTMENT DOOR SEAL. The rubber seal around the nose equipment compartment door edge prevents water leakage, serves as a vibration damper, and acts as a buffer against closing impact of the door.

a. Removal. Pull damaged or distorted seal from door.

b. Cleaning. Clean surface to which seal is to be attached with toluene (item 73, table 1-8), and dry with compressed air.

c. Inspection. Inspect surface to which seal is to be attached for distortion and corrosion.

d. Installation. (1) Apply a coat of primer (item 74, table 1-8) to cleaned surface and allow to dry 30 minutes.

(2) Apply one coat of cement (item 75, table 1-8) to primed surface, and two coats of cement to underside of rubber seal. Allow approximately 20 minutes drying time between cement applications to the rubber seal.

(3) Press seal in place around edge of door when cement becomes tacky but will not transfer to knuckle.

4-23. NOSE EQUIPMENT COMPARTMENT DOOR HINGES. Hinges are provided for support and ease of opening of the nose equipment compartment door.

a. Removal. (1) Remove nose equipment compartment door in accordance with paragraph 4 above.

(2) Remove door stop in accordance with paragraph 4-24.

(3) Drill out rivets from upper and lower hinges; remove hinges.

b. Cleaning. Clean hinges with dry cleaning solvent (item 6, table 1-8). Dry with compressed air.

c. Inspection. (1) Inspect mounting holes for cracks and elongations.

(2) Inspect hinges for cracks and bends.

d. Installation. (1) Position upper hinges and secure with rivets.

(2) Position lower hinge and secure with rivets.

(3) Install door stop in accordance with paragraph 4-24.

(4) Install nose equipment compartment door in accordance with paragraph 4-19.

4-24. NOSE EQUIPMENT COMPARTMENT DOOR STOP. A door stop is attached to the nose equipment compartment door to hold the door in the FULL OPEN position.

a. Removal. (1) Remove screws securing door stop guide (7, figure 4-6) to door jamb, and remove guide.

(2) Remove screws, securing door stop (6) to door (5) and remove door stop.

b. Cleaning. Clean door stop parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. (1) Inspect door stop and door stop guide for excessive wear.

(2) Inspect all attaching parts for condition of threads.

(3) Inspect mounting holes for cracks and elongation.

d. Installation. (1) Position door stop (6, figure 4-6) and secure with screws.

(2) Position door stop guide (7) and secure with screws.

(3) Lift door stop (6) and push in over door stop guide (7) to engage door stop.

4-25. NOSE EQUIPMENT COMPARTMENT ACCESS PANEL. (U-8D, U-8G, RU-8D)

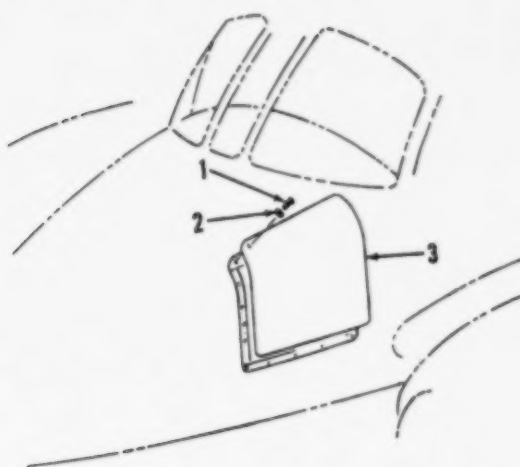
4-26. The nose compartment access panel on the left-hand side of the nose compartment provides access to the equipment in that compartment in addition to the access door on the right-hand side.

a. Removal. (1) Remove screws and washers (1 and 2, figure 4-7).

(2) Lift access panel (3) from aircraft.

b. Cleaning. Refer to paragraph 1-159.

c. Inspection. (1) Inspect screws and nut plates for damaged threads.



1. Screw 2. Washer 3. Access panel

Figure 4-7. Nose equipment compartment access panel (U-8D, U-8G, and RU-8D)

(2) Inspect seal for adhesion, deterioration, and cuts.

d. Installation. (1) Position access panel (3, figure 4-7).

(2) Secure panel with screws (1) and washers (3).

4-27. NOSE EQUIPMENT COMPARTMENT ACCESS PANEL SEAL. A sealant seal secured to the edge of the access panel prevents water leakage into the compartment area.

a. Removal. (1) Remove access panel in accordance with paragraph 4-25.

(2) Pull damaged or distorted seal from access panel.

b. Cleaning. Clean surface to which seal is to be attached with toluene, (item 73, table 1-8) and dry with compressed air.

c. Inspection. Inspect, surface to which seal is to be attached for distortion and corrosion.

d. Installation. (1) Apply 0.12 inch sealant bead, (item 87, table 1-8) to edge of access opening on aircraft and cover bead with non-adhering tape.

(2) Secure access door in accordance with paragraph 4-25.

4-28. NOSE EQUIPMENT COMPARTMENT (U-8F)

4-29. The nose equipment compartment contains most of the avionic equipment components and the brake fluid reservoir. Large access panels

on each side of the nose equipment compartment provide access to this equipment. Removal of the floor panels on the right side of the compartment provides access to heating and ventilating systems equipment.

4-30. NOSE EQUIPMENT COMPARTMENT ACCESS PANELS. (U-8F)

4-31. An access panel, (2, figure 4-8) located on each side of the nose equipment compartment provides access to equipment located in the compartment. Quick release fasteners around outer edges of the panels, a key-operated latch and a rubber seal provide maximum security for the compartment.

a. Removal. (1) Unlock key-operated latch (10, figure 4-8).

(2) Release quick release fasteners (1) around edge access panel (2) and lift access panel from aircraft.

b. Cleaning. Clean access panels in accordance with paragraph 1-159.

c. Inspection. (1) Inspect latch for proper operation.

(2) Inspect quick release fasteners for condition of locking pin and slot in head of fastener.

(3) Inspect area around quick release fasteners for condition of locking pin and slot in head of fastener.

(4) Inspect rubber seal for security, deterioration, and cuts.

d. Installation. (1) Position access panel (2, figure 4-8) and fasten quick release fasteners (1).

(2) Lock key-operated latch (10).

4-32. NOSE EQUIPMENT COMPARTMENT ACCESS PANEL LATCH. A key-operated latch incorporated in each access panel provides maximum security for the compartment.

a. Removal. (1) Remove latch blade screw (7, figure 4-8) securing blade (8) to latch (10) and remove latch blade.

(2) Remove latch retaining nut (9) and lock-washer, then withdraw latch (10) from access panel.

b. Cleaning. Clean parts of latch with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect parts of latch for cracks, bends, or stripped threads.

d. Installation. (1) Insert latch (10), figure 4-8) through access panel and secure with lock-washer and latch retaining nut (9).

(2) Position latch blade (8) and secure with latch blade screw (7).

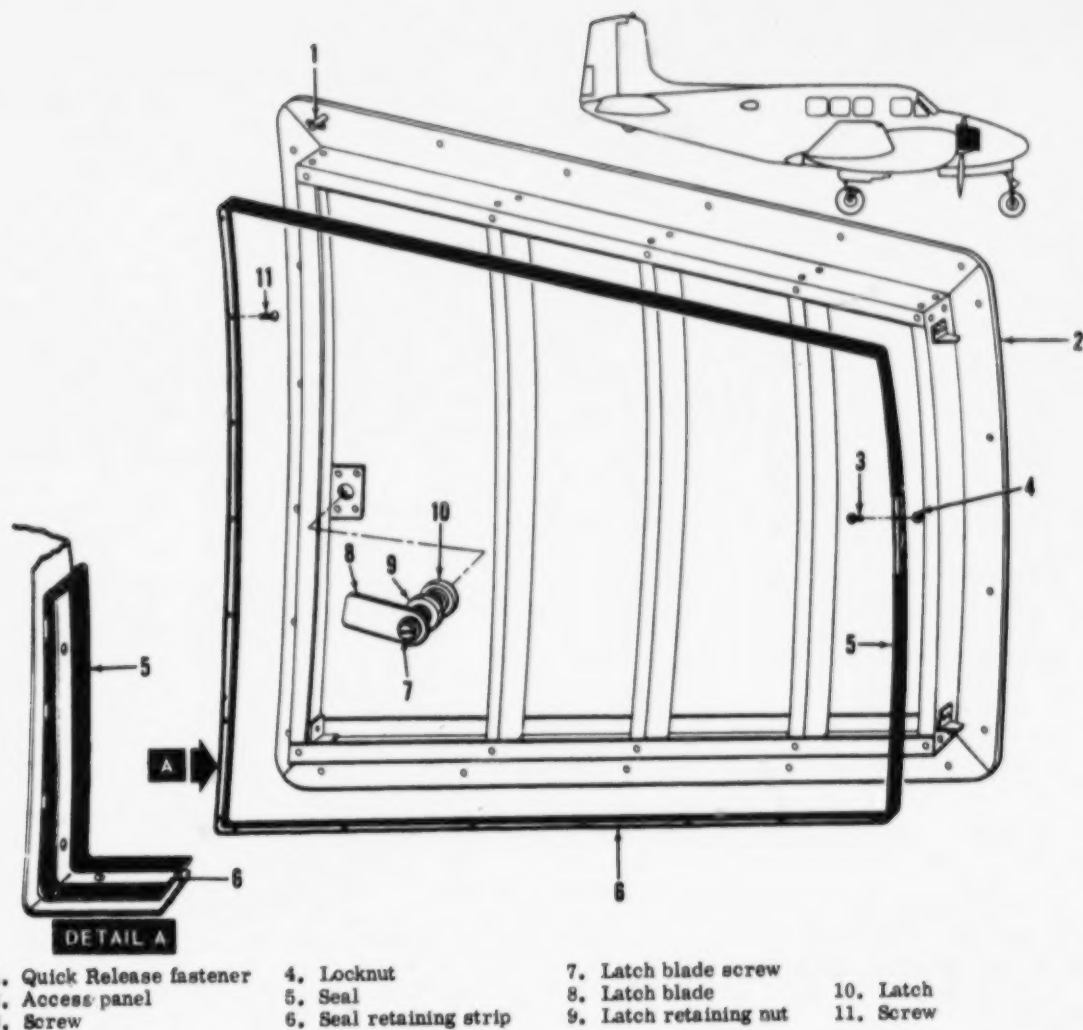


Figure 4-8. Nose equipment compartment access panel (U-8F)

4-33. NOSE EQUIPMENT COMPARTMENT ACCESS PANEL SEAL. A rubber seal secured to the edge of each access panel opening prevents water leakage and serves as a vibration damper.

a. Removal. Remove screws (3 and 11, figure 4-8) and locknuts (4) securing seal retaining strips (6); remove seal (5).

b. Cleaning. Clean surface to which seal is to be attached with toluene (item 73, table 1-8) and dry with compressed air.

c. Inspection (1) Inspect seal retaining strips for cracks and bends.

(2) Inspect seal for deterioration and cuts.
d. Installation (1) Position seal (5, figure 4-8) around access panel opening.

(2) Install seal retaining strips (6) and secure with screws (3 and 11) and locknuts (4).

4-34. CABIN COMPARTMENT(U-8D,RU-8D)

4-35. Entrance to the cabin compartment is provided by a door on the right side of the fuselage. U-8D aircraft are provided with a retractable

step which assists in boarding the aircraft. The cabin compartment is provided with acrylic plastic windshield and window assemblies. Seats for a pilot, copilot, and four passengers are provided in the U-8D. Seats for a pilot, copilot, and two passengers are provided in the RU-8D. The remainder of the RU-8D cabin is supplied with equipment provisions. All seats are equipped with shoulder harnesses attached to automatic inertia reels. The cabin compartment is also furnished with upholstery, curtains, armrests, sunvisors, carpeting, relief tube assemblies, and first aid kits.

4-36. CABIN COMPARTMENT DOOR. (U-8D, RU-8D)

4-37. The cabin compartment door is of all-metal construction incorporating a channel-type framework to which the skin is spotwelded. Access and inspection panels under the upholstery permit inspection and adjustment of the latching mechanism. Additional access is provided through a panel in the outer skin of the door. The door is equipped with a key lock handle on the outside and a pull-type, lever-action handle on the inside. An emergency release handle and mechanism are located on the inside of the door.

a. Cleaning. Clean compartment door in accordance with paragraph 1-159.

b. Inspection. (1) Inspect door latching mechanism for proper operation.

(2) Inspect door hinges for alignment, security, and cracks around mounting holes.

(3) Inspect emergency release mechanism quick release links for alignment.

(4) Inspect door seal for security, deterioration, and cuts.

4-38. FUSELAGE STEP. (U-8D)

4-39. The step incorporated in the fuselage for passenger assist extends below the trailing edge of the right wing and retracts into the step well under the baggage compartment. Automatic extension and retraction of the step are controlled by a pressure switch in the fuel system of the right engine and accomplished by a slide chain. The step retracts when the right engine is started and the fuel pressure reaches 5-1/2 psi. Step extension occurs when the right engine is stopped and the fuel pressure drops to approximately 5-1/2 psi. Inflight extension of the step due to stoppage of the right engine is prevented by routing the step control circuit through the landing

gear safety switch. A key-operated selector switch aft of the baggage compartment door may be used to extend or retract the step.

NOTE

The BATTERY MASTER switches on the right subpanel must be placed in ON position to operate the step from outside the flight compartment. Use only the key-operated battery switch to turn off the ignition system.

a. Cleaning. Clean fuselage steps in accordance with paragraph 1-159. Step slide tube (12, figure 2-1) should be wiped clean and lubricated in accordance with figure 2-1.

b. Inspection (1) Check automatic and key-operated functions of fuselage step for proper operation.

(2) Inspect all stops for security and condition.

(3) Inspect limit switches for security, ease of plunger operation, and condition of wiring.

(4) Inspect step slide chain for condition and proper tension.

4-40. FUSELAGE STEP SLIDE CHAIN. The fuselage step slide chain moves the step in and out from beneath the fuselage step well.

a. Removal (1) Extend fuselage step.

(2) Disconnect ends of slide chain from slide chain adjustment barrel.

(3) Remove slide chain from drive sprocket.

b. Cleaning. Clean slide chain with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect slide chain for cracks, bent links, and elongation of mounting holes.

d. Installation. (1) Position slide chain on drive sprockets.

(2) Connect slide chain ends to slide chain adjustment barrel.

(3) Adjust slide chain so that, with step in OUT position, a pressure of 3 pounds on forward strand toward rear strand will deflect chain no more than 1/4-inch.

4-41. FUSELAGE STEP ELECTRICAL CONTROL COMPONENTS. Refer to paragraphs 12-135 through 12-148 for location, operation, and maintenance instructions for fuselage step electrical control components.

4-42. WINDSHIELD. (U-8D, RU-8D)

4-43. The U-8D and RU-8D aircraft have three-piece windshields formed from transparent

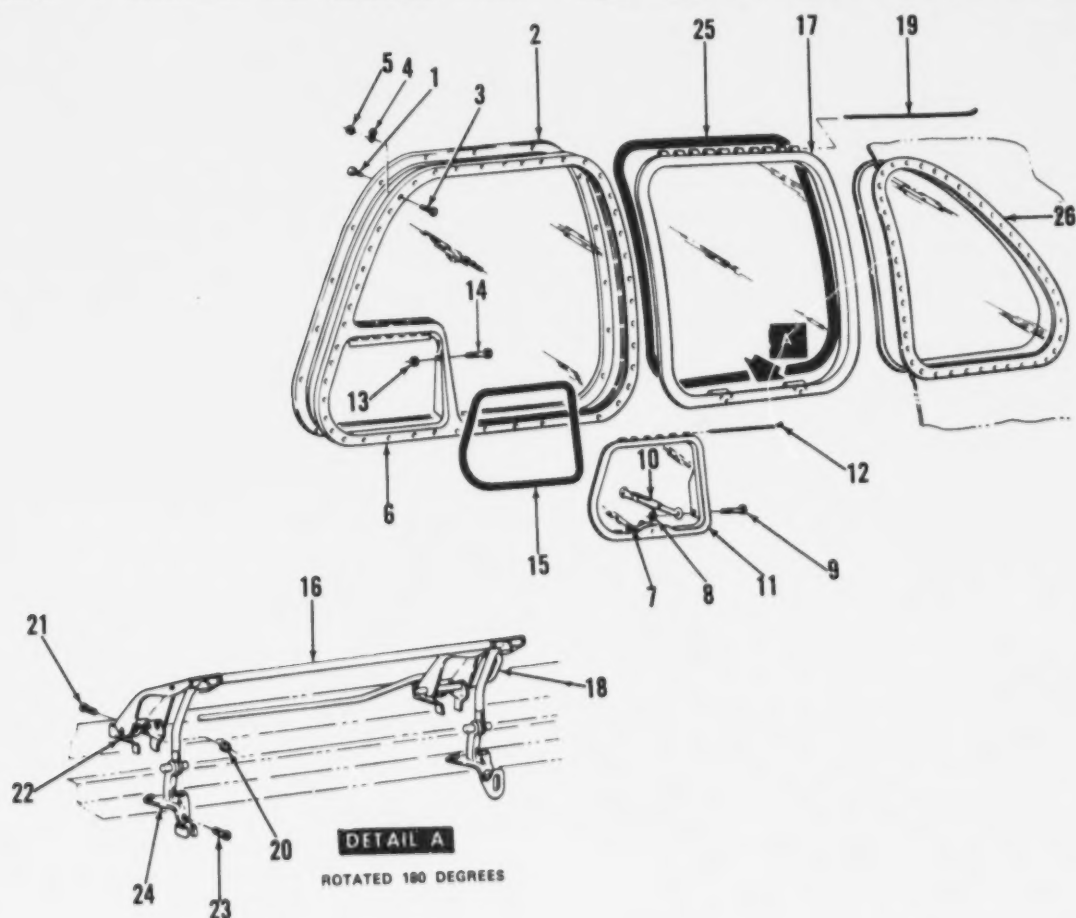
acrylic plastic sheet mounted in aluminum frames. The windshield assemblies are secured to the aircraft by screws and nuts around the edges of the frame. Sealing compound is applied between windshield frames and fuselage to prevent water and air from entering the cabin compartment.

a. Cleaning. Clean acrylic plastic windshield panels in accordance with paragraph 1-159.

b. Inspection. Inspect windshield plastic for cracks, crazing, and discoloration.

4-44. WINDOWS. (U-8D)

4-45. Three acrylic plastic windows are installed on each side of the cabin compartment (figure 4-9). The forward and center windows.



- | | | |
|----------------------------|----------------------------|---------------------------|
| 1. Screw | 10. Window stop | 18. Emergency release pin |
| 2. Forward window moulding | 11. Storm window assembly | 19. Hinge pin |
| 3. Screw | 12. Hinge pin | 20. Nut |
| 4. Clip | 13. Nut | 21. Screw |
| 5. Nut | 14. Bolt | 22. Latch bracket |
| 6. Forward window assembly | 15. Seal | 23. Screw |
| 7. Latch | 16. Latch assembly | 24. Latch support |
| 8. Nut | 17. Center window assembly | 25. Seal |
| 9. Bolt | | 26. Rear quarter window |

Figure 4-9. Window installation (U-8D, U-8G, and RU-8D)

are formed from sheet plastic, mounted in spotwelded aluminum frames. The aft windows are formed from sheet plastic and riveted to the aircraft structure. The hinged center windows incorporate quick release latches and are used for ground emergency exits.

4-46. FORWARD WINDOWS. The left forward window incorporates a storm window for the pilot and is secured to the aircraft with screws. The right forward window is installed in the cabin compartment door and secured with screws.

a. Removal. (1) Remove screws (1, figure 4-9) securing forward window moulding (2) and remove moulding.

(2) Remove screws (3), clips (4), and nuts (5) securing forward window assembly (6).

(3) Push forward window assembly (6) inward and remove.

b. Cleaning. (1) Remove old sealing compound from window frame and airframe.

(2) Clean window plastic in accordance with paragraph 1-159.

c. Inspection. (1) Inspect windows for cracks, crazing, and discoloration.

(2) Inspect all mountings for cracks and distortion; inspect screws for damaged threads.

d. Installation. (1) Apply two strips of sealing compound (item 77, table 1-8) to forward window assembly (6, figure 4-9).

(2) Position forward window assembly (6) and secure with screws (3), clips (4), and nuts (5).

(3) Position forward window moulding (2) and secure with screws (1).

4-47. STORM WINDOW. A storm window is incorporated in the lower forward corner of the left forward window. The storm window consists of a sheet of acrylic plastic riveted to an aluminum frame, a continuous hinge along the top of the window, a stop mechanism to hold the window open, and a latch for security. A rubber seal on the window frame prevents air and water leakage and serves as a vibration damper.

a. Removal. (1) Release storm window latch (7, figure 4-9).

(2) Remove nut (8) and bolt (9) securing window stop (10) to storm window assembly (11).

(3) Remove hinge pin (12) from storm window assembly (11) and remove window.

b. Cleaning. Clean window plastic in accordance with paragraph 1-159.

c. Inspection. (1) Inspect hinge for security and cracks; inspect hinge pin for distortion.

(2) Inspect latch for proper operation and security.

(3) Inspect window for cracks, crazing, and discoloration.

d. Installation. (1) Position storm window assembly (11, figure 4-9) and insert hinge pin (12) through hinge.

(2) Secure window stop (10) to storm window assembly (11) with bolt (9) and nut (8).

(3) Close storm window assembly (11) and secure latch (7).

4-48. STORM WINDOW STOP. A stop mechanism installed on the storm window holds the storm window in the open position.

a. Removal. Remove nuts (8 and 13, figure 4-9) and bolts (9 and 14) securing window stop (10). Remove window stop.

b. Cleaning. Clean window stop with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect window stop for condition and proper operation.

d. Installation. Position window stop (10, figure 4-9) and secure with bolts (9 and 14) and nuts (8 and 13).

4-49. STORM WINDOW LATCH. A latch is provided to secure the storm window in the closed position.

a. Removal. Drill out rivets securing latch (7, figure 4-9) to storm window assembly (11) and remove latch.

b. Cleaning. Clean latch with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect latch for proper operation.

d. Installation. Position latch (7, figure 4-9) on storm window assembly (11) and secure with rivets.

4-50. STORM WINDOW SEAL. A seal is installed around the edge of the storm window assembly to prevent water and air from entering the cabin compartment.

a. Removal. Remove damaged seal by pulling seal (15, figure 4-9) from storm window assembly (11).

b. Cleaning. Clean surface to which seal was attached with toluene (item 73, table 1-8) and dry with compressed air.

c. Inspection. Inspect area to which seal is to be attached for distortion and corrosion.

d. Installation. (1) Apply a coat of cement (item 75, table 1-8) to the storm window assembly (11, figure 4-9) and two coats to the seal (15) allowing approximately 20 minutes drying time between coats.

(2) Press seal (15) in place around storm window assembly (11) when cement becomes tacky.

4-51. CENTER WINDOWS. The center windows are hinged at the top and incorporate quick release latches, making the windows suitable for ground emergency exits. A rubber seal is provided to prevent air and water leakage and to serve as a vibration damper.

a. Removal. (1) Release latch assembly (16, figure 4-9) and open center window assembly (17).

(2) Pull emergency release pin (18) from latch assembly (16).

(3) Pull hinge pin (19) from hinge and remove center window assembly (17).

(4) Remove nuts (20) and screws (21) securing latch bracket (22) to center window assembly (17).

b. Cleaning. (1) Clean latch with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

(2) Clean window plastic in accordance with paragraph 1-159.

c. Inspection. (1) Inspect latch assembly for proper operation.

(2) Inspect emergency release pin and hinge pin for distortion.

(3) Inspect windows for cracks, crazing, and discoloration.

d. Installation. (1) Position latch bracket (22, figure 4-9) on center window assembly (17) and secure with screws (21) and nuts (20).

(2) Position center window assembly (17), align hinge halves and install hinge pin (19).

(3) Partially close window and install emergency release pin (18).

(4) Close and latch window.

4-52. CENTER WINDOW LATCH. A latch is provided on each center window for security.

a. Removal. (1) Release latch assembly (16, figure 4-9) and open center window assembly (17).

(2) Remove emergency release pin (18) from latch assembly (16).

(3) Remove nuts (20) and screws (21) securing latch brackets (22) to center window assembly (17).

(4) Remove screws (23) securing window latch supports (24) to airframe and remove latch assembly (16).

b. Cleaning. Clean latch with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. (1) Inspect mounting holes for cracks; screws for condition of threads.

(2) Inspect emergency release pin for distortion.

d. Installation (1) Position window latch supports (24, figure 4-9) on airframe and secure with screws (23).

(2) Position latch brackets (22) on center window assembly (17) and secure with screws (21) and nuts (20).

(3) Partially close window and install emergency release pin (18).

(4) Close and latch window.

4-53. CENTER WINDOW SEAL. Rubber seals cemented to the airframe prevent water and air from entering the cabin compartment. They also serve as a vibration damper between the window frames and fuselage.

a. Removal. Remove damaged seal (25, figure 4-9) by pulling seal from airframe.

b. Cleaning. Clean surface where seal was attached with toluene (item 73, table 1-8) and dry with compressed air.

c. Inspection. Inspect area to which seal is to be attached for distortion and corrosion.

d. Installation. (1) Apply one coat of cement (item 75, table 1-8) to center window assembly and two coats to rubber seal, allowing approximately 20 minutes drying time between coats.

(2) Press seal in place around window frame when cemented edges become tacky.

4-54. REAR QUARTER WINDOWS. The rear quarter windows (26, figure 4-9) are formed of acrylic plastic and riveted to the aircraft structure.

a. Cleaning. Clean window plastic in accordance with paragraph 1-159.

b. Inspection. Inspect windows for cracks, crazing, and discoloration.

4-55. SEATS. (U-8D, RU-8D)

4-56. The U-8D aircraft has seating accommodations for six people, including the pilot and copilot. The seats are divided into three sections consisting of a pilot and copilot seat, front passenger seat, and rear passenger seat. The front passenger seat swings forward on hinges to permit access to the rear passenger seat. The RU-8D has seating accommodations for four people, including the pilot and copilot. The front seats are divided into two sections consisting of a pilot and copilot seat and a front passenger seat. The front passenger seat swings forward on hinges to permit access to the single rear passenger seat.

4-57. PILOT AND COPILOT SEAT. The pilot and copilot seat (figure 4-10) consists of a single sheet metal seat bottom assembly; separate

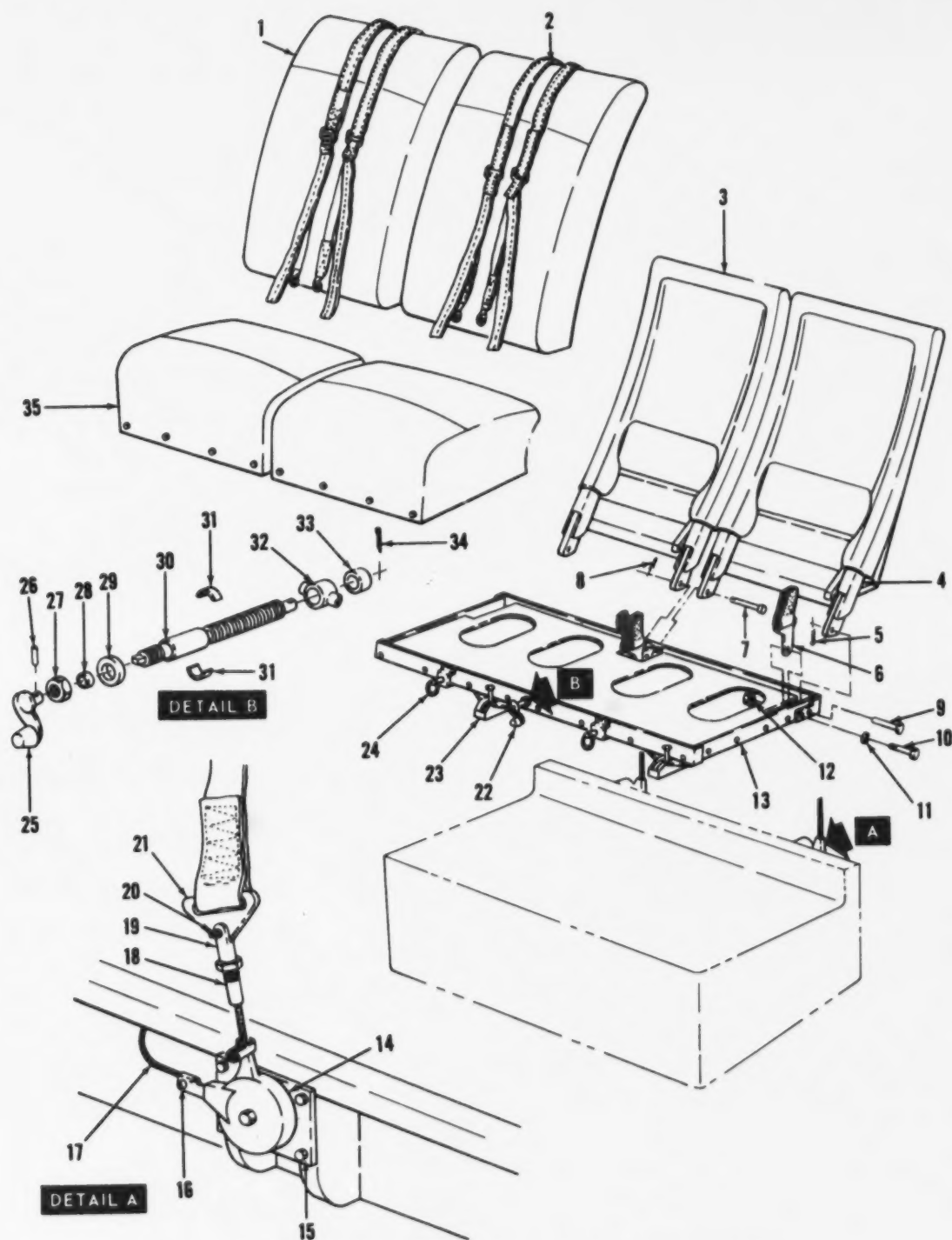


Figure 4-10. Pilot and copilot seat (U-8D and RU-8D) (sheet 1 of 2)

1. Seat back cushion	10. Bolt	19. Cable clevis	27. Nut
2. Shoulder harness assembly	11. Washer	20. Bolt, washer, nut	28. Sleeve bearing
3. Slip cover	12. Nut	21. Shoulder harness fitting	29. Ball bearing
4. Seat back frame	13. Seat bottom frame	22. Seat adjustment mechanism	30. Adjusting screw
5. Cotter pin	14. Inertia reel assembly	23. Control assembly	31. Spacer
6. Seat belt fitting	15. Bolt, washer, nut	24. Quick-lock fastener	32. Universal
7. Pin	16. Screw, washer, nut	25. Handle	33. Spacer
8. Cotter pin	17. Cable	26. Pin	34. Cotter pin
9. Pin	18. Cable plunger		35. Seat bottom cushion

Figure 4-10. Pilot and copilot seat (U-8D and RU-8D) (sheet 2 of 2)

sheet metal seat back panels; and removable, padded, spring seat cushions. A handle located on the seat bottom assembly adjusts the seat fore and aft.

a. Removal. (1) Remove seat back and seat bottom cushions (1 and 35, figure 4-10).

(2) Position seat in full forward position.

(3) Pull out spring-loaded pin fasteners in seat adjustment castings.

(4) Release quick-lock fasteners (24) on front of seat slides by turning rings counterclockwise and pulling pins out.

(5) Remove seat by lifting forward edge of seat and pulling seat forward.

b. Cleaning. (1) Clean metal parts of seat with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

(2) Clean upholstery in accordance with paragraph 1-159.

c. Inspection. (1) Inspect metal parts of seats for cracks or bends.

(2) Inspect upholstery for fraying, cuts, and condition of stitching and snap fasteners.

d. Installation. (1) Position seat on slides and secure quick-lock fasteners (24, figure 4-10).

(2) Pull out spring-loaded pin fasteners in seat adjustment castings and align pins. Release fasteners to lock seat in position.

(3) Check seat for proper movement fore and aft.

(4) Position cushions (1 and 35) and secure snap fasteners.

4-58. PILOT'S AND COPILOT'S SEAT UPHOLSTERY. The pilot and copilot seat upholstery consists of removable padded spring seat cushions for the seat back and seat bottom and a slip cover secured to each seat back with snap fasteners.

a. Removal. (1) Unfasten snap fasteners securing cushions (1 and 35, figure 4-10) to seat frame and remove cushions.

(2) Unfasten snap fasteners securing slip cover (3) and remove slip cover.

b. Cleaning. Clean upholstery in accordance with paragraph 1-159.

c. Inspection. Inspect seat cushions and slip covers for fraying and condition of snap fasteners and stitching.

d. Installation. (1) Position slip cover (3) on seat frame and secure snap fasteners.

(2) Position cushions (1 and 35) on seat frame and fasten snap fasteners.

4-59. PILOT AND COPILOT SEAT ADJUSTMENT MECHANISM. Fore-and-aft adjustment of the pilot and copilot seat is provided by a mechanism located in the seat bottom assembly.

a. Removal. (1) Remove pin (26, figure 4-10) securing handle (25) to adjusting screw (30).

(2) Remove nut (27), sleeve bearing (28), and ball bearing (29) from adjusting screw (30).

(3) Remove spacers (31), cotter pin (34), and adjusting screw (30) from universal (32) and spacer (33). Remove universal and spacer.

b. Cleaning. Clean parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect parts for cracks, bends, and condition of threads.

d. Installation. (1) Install universal (32, figure 4-10), adjusting screw (30), spacer (33), cotter pin (34), and spacers (31).

(2) Install ball bearing (29), sleeve bearing (28), and nut (27).

(3) Position handle (25) on adjusting screw (30) and secure with pin (26).

4-60. FRONT PASSENGER SEAT. The front passenger seat (figure 4-11) pivots forward and to the left on a skewed axis to provide access to the rear passenger seat. A seat locking mechanism incorporated in the seat, actuated by a pin and cable arrangement attached to the cabin compartment door, latches the back of the seat to the main spar. Opening the door withdraws the locking pins so the seat may be tilted forward. A handle on the back of the seat provides an emergency method of releasing the seat locking pins.

a. Removal. (1) Remove seat back and seat bottom cushions (1 and 12, figure 4-11).

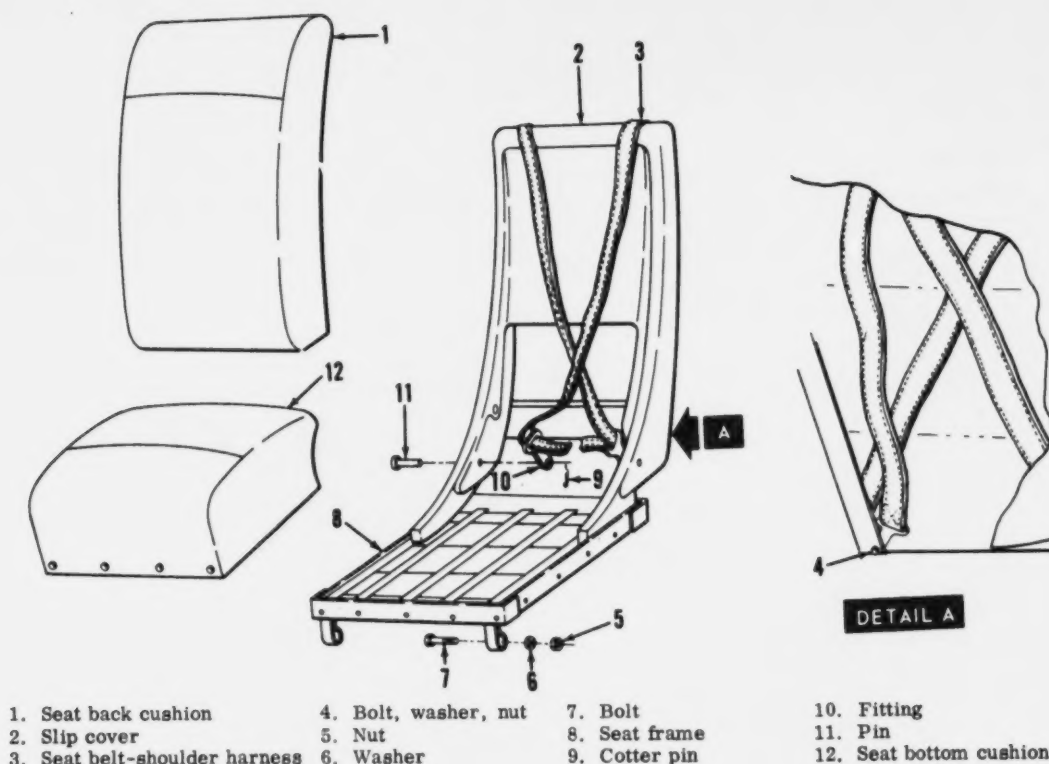


Figure 4-11. Front passenger seat (U-8D and RU-8D)

(2) Ensure that cabin compartment door is full open and pins released from back of seat.

(3) Remove bolt (7), washer (6), and nut (5) securing seat to spar and remove seat.

b. Cleaning (1) Clean metal parts of seat with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

(2) Clean upholstery in accordance with paragraph 1-159.

c. Inspection. (1) Inspect metal parts of seat for cracks or bends.

(2) Inspect upholstery for fraying, cuts, and condition of stitching and snap fasteners.

d. Installation. (1) Position seat and secure with bolt (7, figure 4-11), washer (6), and nut (5).

(2) Position cushions (1 and 12) and secure snap fasteners.

4-61. FRONT PASSENGER SEAT UPHOLSTERY. The front passenger seat upholstery consists of removable padded spring seat cushions

for the seat back and seat bottom, and a slip cover secured to the seat back with snap fasteners.

a. Removal. (Unfasten snap fasteners securing cushions (1 and 12, figure 4-11) to seat frame and remove cushions.

(2) Unfasten snap fasteners securing slip cover (2) and remove slip cover.

b. Cleaning. Clean upholstery in accordance with paragraph 1-159.

c. Inspection. Inspect upholstery for fraying, cuts, and condition of stitching and snap fasteners.

d. Installation. (1) Position slip cover (2, figure 4-11) on seat frame and secure snap fasteners.

(2) Position cushions (1 and 12) on seat frame and secure snap fasteners.

4-62. FRONT PASSENGER SEAT LOCKING MECHANISM. A locking mechanism (figure 4-12) latches the back of the front passenger seat to the main spar by pins linked to the cab-

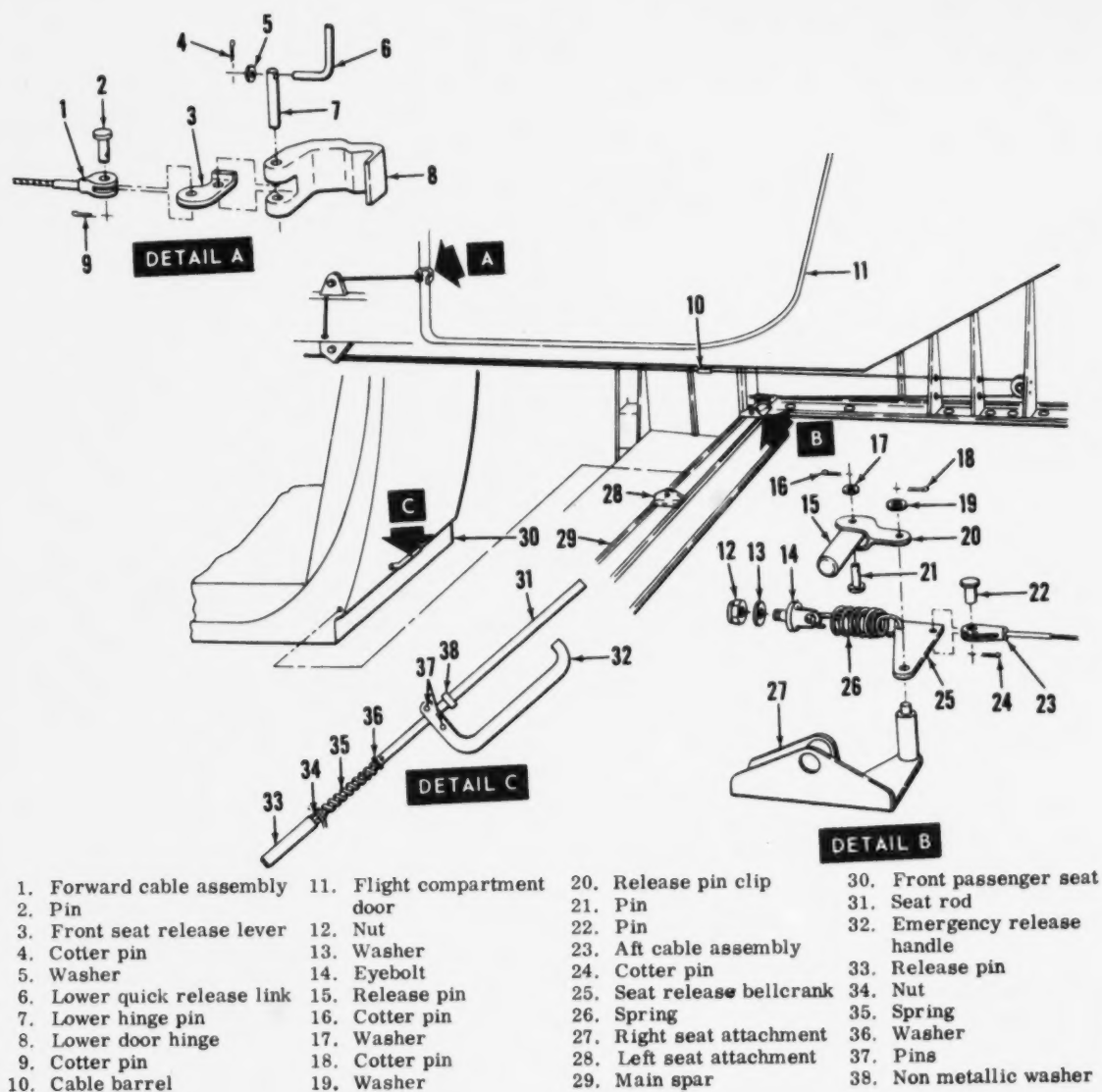


Figure 4-12. Front passenger seat locking mechanism (U-8D and RU-8D)

in compartment door. Opening the door withdraws the pin so the seat may be tilted forward. The right latching pin slides in a bracket attached to the spar and fits into a hole in the seat structure. The left latching pin is incorporated in the seat structure and fits into a bracket on the spar. A cable attached to the lower hinge on the cabin compartment door is routed aft beneath the door to a pulley beneath the center window, then forward to the latching

pin actuating linkage. A spring from the actuating linkage to the fuselage sidewall structure returns the latching pins to the locked position when the door is closed. The left latching pin releases on withdrawal of the right latching pin and is returned as the right latching pin returns. An emergency release handle located in the back of the seat releases both pins if the door linkage fails.

a. Removal. (1) Remove upholstery panels

from right side of flight compartment in accordance with paragraph 4-71.

(2) Cut lock wire and unscrew cable barrel (10, figure 4-12) to disconnect forward and aft cable assemblies (1 and 23).

(3) Remove cotter pin (4) and washer (5) from lower quick release link (6) and remove quick release link from lower hinge pin (7) and pull hinge pin up to release front seat release lever (3) from lower door hinge (8).

CAUTION

Reinstall hinge pin to prevent damage to flight compartment door.

(4) Remove cotter pin (9) from pin (2) securing forward cable assembly (1) to front seat release lever (3).

(5) Remove cotter pin (24) from pin (22) and remove pin from aft cable assembly (23).

(6) Remove nut (12) and washer (13) securing eyebolt (14) and remove eyebolt and spring (26).

(7) Remove cotter pin (18) and washer (19) securing seat release bellcrank (25) and release pin clip (20), and remove bellcrank and release pin clip.

(8) Remove cotter pin (16) and washer (17) from pin (21) securing release pin (15) to release pin clip (20), and remove pin and release pin clip.

(9) Remove cable assemblies (1 and 23).

(10) Remove pins (37) from emergency release handle (32) and remove handle.

(11) Remove release pin (33), nut (34), spring (35), washer (36), and nonmetallic washer (38) from seat rod (31) and remove seat rod.

b. Cleaning. Clean parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. (1) Inspect cables for wear and broken strands.

(2) Inspect pulleys, bellcrank, and release lever for cracks and elongation of holes.

d. Installation. (1) Position seat rod (31) and install non-metallic washer (38), washer (36), spring (35), nut (34), and release pin (33).

(2) Position emergency release handle (32) and install pins (37).

(3) Position release pin (15) in release pin clip (20) and secure with pin (21), washer (17), and cotter pin (16).

(4) Position release pin clip (20) and seat release bellcrank (25) and secure with washer (19) and cotter pin (18).

(5) Position eyebolt (14) and secure with washer (13) and nut (12).

(6) Install spring (26) in eyebolt (14) and seat release bellcrank (25). Secure aft cable assembly (23) to seat release bellcrank (25), with pin (22) and cotter pin (24) and route aft cable assembly.

(7) Position forward cable assembly (1) on front seat release lever (3) and secure with pin (2) and cotter pin (9).

(8) Secure front seat release lever (3) to lower door hinge (8) with lower hinge pin (7).

(9) Secure lower hinge pin (7) to lower quick release link (6) with washer (5) and cotter pin (4).

(10) Route forward cable and connect forward and aft cable assemblies (1 and 23) at cable barrel (10) and secure cable barrel with lock wire.

(11) Install upholstery panels on right side of flight compartment in accordance with paragraph 4-71.

4-63. REAR PASSENGER SEAT. The rear passenger seat on the U-8D aircraft (figure 4-13) has individual removeable seat bottom and seat back cushions. The seat back is hinged to facilitate removal of the seat frame assembly from the aircraft. Adjustable slide assemblies provide fore-and-aft seat back adjustment.

a. Removal. (1) Remove adjustable slide assemblies from seat back in accordance with paragraph 4-65.

(2) Remove seat back and seat bottom cushions (1 and 14, figure 4-13) by unfastening snap fasteners.

(3) Release trunk-type fasteners (15) securing seat bottom to front of seat mounting structure.

(4) Push seat aft to disengage rear mounting pins from mounting pad.

(5) Fold seat back down and remove seat from aircraft.

b. Cleaning. (1) Clean metal parts of seat with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

(2) Clean upholstery in accordance with paragraph 1-159.

c. Inspection. (1) Inspect metal parts of seat for cracks or bends.

(2) Inspect attaching points for wear and distortion.

(3) Inspect seat cushions for fraying, cuts, and condition of stitching.

d. Installation (1) Position seat in aircraft and insert rear mounting pins in mounting pads.

(2) Fasten trunk-type fasteners (15, figure 4-13) to secure front of seat to seat mounting structure.

(3) Install seat back and seat bottom cushions (1 and 14) and fasten snap fasteners.

(4) Install adjustable slide assemblies on seat back in accordance with paragraph 4-65.

4-64. REAR PASSENGER SEAT UPHOLSTERY. The rear passenger seat upholstery on the U-8D aircraft consists of individual, removable, padded spring seat bottom and seat back cushions (1 and 14, figure 4-13).

a. Removal. Unfasten snap fasteners securing cushions (1 and 14, figure 4-13) to seat frame and remove cushions.

b. Cleaning. Clean upholstery in accordance with paragraph 1-159.

c. Inspection. Inspect seat cushions for fraying, cuts, and condition of stitching.

d. Installation. Position cushions (1 and 14, figure 4-13) on seat frame and fasten snap fasteners.

4-65. REAR PASSENGER SEAT ADJUSTABLE SLIDE ASSEMBLIES. On the U-8D, adjustable slide assemblies (figure 4-14) provide a means of adjustment for the back of the rear passenger seat. Each slide assembly consists of two formed sheet steel channels and a locking cam. The forward end of each slide assembly is secured to the seat back frame, and the aft end is secured to a nutplate beneath the upholstery. Adjustment of the seat back is accomplished by pulling the seat back full forward to release the latches then moving seat back to the full aft position. To return the seat to

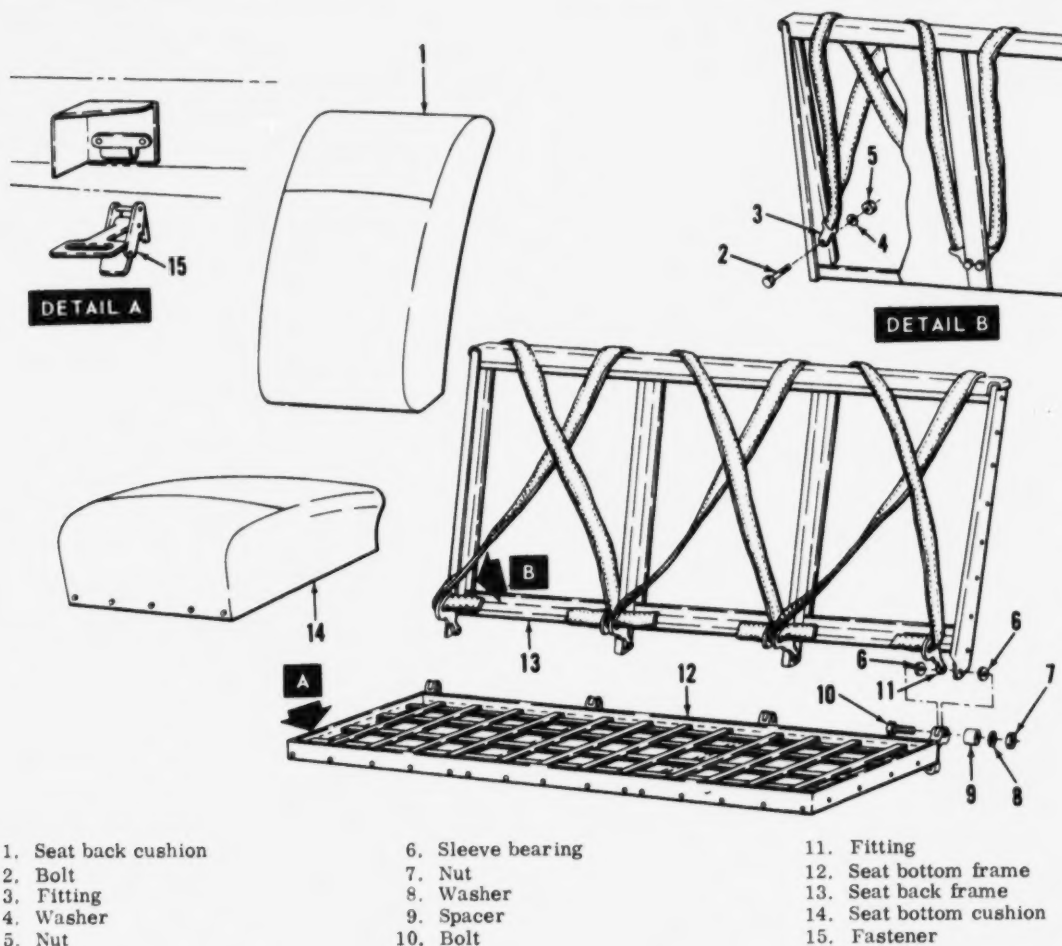
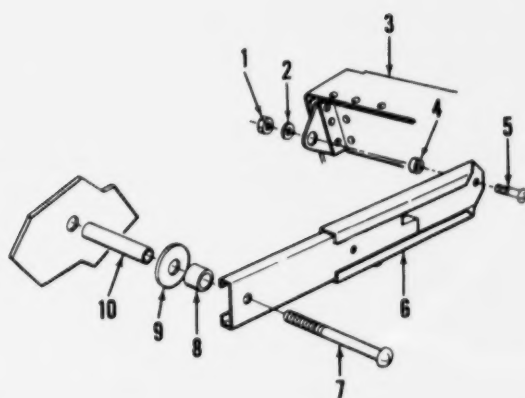


Figure 4-13. Rear passenger seat (U-8D and RU-8D)



- | | |
|--------------------|------------------------------|
| 1. Nut | 6. Adjustable slide assembly |
| 2. Washer | 7. Screw |
| 3. Seat back frame | 8. Spacer |
| 4. Spacer | 9. Washer |
| 5. Bolt | 10. Spacer |

Figure 4-14. Rear passenger seat adjustable slide assembly (U-8D and RU-8D)

the forward position, pull seat back forward until the latches engage.

a. Removal. (1) Remove bolt (5, figure 4-14), spacer (4), washer (2), and nut (1) securing forward end of adjustable slide assembly (6) to rear passenger seat back frame (3).

(2) Remove screw (7), spacer (8 and 10), and washer (9) securing aft end of adjustable slide assembly (6) to nutplate under upholstery on fuselage sidewall.

b. Cleaning. Clean parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. (1) Inspect adjustable slide assemblies for proper operation of latches.

(2) Inspect mounting hardware for condition of threads.

d. Installation. (1) Position forward end of adjustable slide assembly (6, figure 4-14) on seat back frame (3) and secure with bolt (5), spacer (4), washer (2), and nut (1).

(2) Position long spacer (10), then place washer (9) and spacer (8) over protruding end of spacer (10).

(3) Position aft end of adjustable slide assembly (6) and secure with screw (7).

4-66. SEAT BELTS. All seats in the aircraft are equipped with seat belts to restrain forward movement of the occupant in the event of bad weather, sudden deceleration, or a crash landing. The pilot's and copilot's seat belts are anchored to the sides of the seats. The pas-

sengers' seats are equipped with a combination seat and shoulder harness belt attached to the seat sides and back.

a. Removal. (1) Remove seat cushions from seats in accordance with paragraph 4-57, 4-60, and 4-63.

(2) Remove bolt (10, figure 4-10), washer (11), and nut (12) that secure each half of pilot's and copilot's seat belts to seat structure.

(3) Remove bolt (2, figure 4-13), washer (4), and nut (5) securing shoulder harness portion of passengers' seat belts to back of seat.

(4) Remove bolt (10), washer (8), spacer (9), sleeve bearings (6), and nut (7) securing seat belt to each side of each passenger seat and remove belts.

b. Cleaning. Clean seat belts in accordance with TM 55-1500-204-25/1.

c. Inspection. (1) Inspect webbing of seat belts for fraying, cuts, and broken threads.

(2) Inspect metal parts of seat belts for cracks or bends.

d. Installation. (1) Position seat belt in seat.

(2) Align mounting bracket on pilot's and copilot's seat belts with clamp on seat structure and secure with bolt (10, figure 4-10), washer (11), and nut (12).

(3) Position seat belt on each side of passenger seat and secure with bolt (10, figure 4-13), washer (8), spacer (9), sleeve bearings (6), and nut (7).

(4) Position shoulder harness portion of passenger seat belt on back of seat and secure with bolt (2), washer (4), and nut (5).

95) Install seat cushions in accordance with paragraphs 4-57, 4-60, and 4-63.

4-67. SHOULDER HARNESS. The pilot's and copilot's seats are equipped with shoulder harnesses to restrain forward movement of the occupants. The shoulder harnesses are attached to automatic inertia reels which allow the added movement necessary to operate all controls. The inertia reels are attached to the main spar web behind each seat and is controlled by a two-position lever in a control quadrant located on the left forward edge of each seat.

a. Removal. (1) Remove bolt, washer, and nut (20), figure 4-10) securing shoulder harness fitting (21) to inertia reel cable clevis (19).

(2) Remove shoulder harness.

b. Cleaning. Clean shoulder harness in accordance with TM 55-405-3.

c. Inspection. (1) Inspect shoulder harness webbing for fraying, cuts, and broken threads.

(2) Inspect metal plate and buckles for cracks

or burrs that could cause snagging of the shoulder harness.

(3) Inspect loop-ends for wear.

d. Installation. (1) When a new shoulder harness is installed, webbing should first be flexed by pulling it across or around a metal bar approximately 1/4 inch in diameter. This will make webbing pliable by breaking down finishing glaze that is applied to new nylon webbing. Accomplish this procedure on both sides of webbing.

(2) Position shoulder harness over back of seat.

(3) Secure shoulder harness fitting (21, figure 4-10) to cable clevis (19) with bolt, washer, and nut (20).

4-68. INERTIA REEL ASSEMBLY. The inertia reel assembly (figure 4-15) is attached to the main spar web behind each seat and is controlled by a two-position lever in a control quadrant located on the left forward edge of each seat. A flexible cable and housing assembly links each control handle to its respective inertia reel. A spring-loaded latch in the end of the handle locks the handle in either selected position. When the handle is unlocked (aft), the inertia reel maintains a slight tension on the harness, but permits the pilot or copilot to lean forward to reach the controls. When the handle is moved to the locked (forward) position, the inertia reel locks the harness in successive positions as the pilot leans back. Before the inertia reel can be unlocked, all tension must be removed from the harness by leaning full back in the seat. If the handle is in the unlocked (aft) position, an impact force of 2 G's will automatically lock the inertia reel and prevent the occupant from being thrown forward. To unlock the inertia reel after a 2-G force has locked it, the handle must be moved to the locked (forward) position and then to the unlocked (aft) position.

a. Removal. (1) Remove seat cushions from seat in accordance with paragraph 4-57, 4-60, and 4-63.

(2) Remove bolt, washer, and nut (20, figure 4-10) securing shoulder harness fitting (21) to inertia reel cable clevis (19), and remove shoulder harness assembly (2).

(3) Loosen retaining screw on cable stop (24, figure 4-15) and remove cable stop.

NOTE

Due to the small size of the cable stop, care should be exercised not to lose it.

(4) Loosen clamp from cable housing at control quadrant.

(5) Loosen clamps on side of seat, and withdraw control cable assembly (23).

(6) Remove bolts, washers, and nuts (15, figure 4-10) securing inertia reel assembly (14) and remove inertia reel assembly.

NOTE

If a new inertia reel assembly is to be installed, the length of the old cable housing should be determined and a new cable housing cut to the proper length.

d. Disassembly. (1) Remove nut (26, figure 4-15), screw (35), and clamp (25) from plate (36), and free control cable assembly (23).

(2) Remove nuts (41) and screws (37) securing sector (38) to plate (36).

(3) Remove sector (38) from slot in control handle (40).

WARNING

To prevent the compression spring (39) from throwing the control handle (40) and causing injury to personnel, press down on control handle until spring tension is sufficiently relieved to safely remove the compression spring.

(4) Gradually relieve tension on control handle (40), and remove control handle and compression spring (39) from tubular recess in plate (36).

(5) Drill out rivets (1) which secure pin and base assembly (2) to inertia reel case (12). Remove staylock cover (15).

(6) Remove screw (14) and lockwasher (13) from pin and base assembly (2) and inertia reel case (12).

(7) Hold inertia reel case (12) stationary, pull out inertia reel cable (7), and allow pin and base assembly (2) to rotate. Lift inertia reel case from pin and base assembly and slide to end of inertia reel cable.

(8) Remove washer (5) from inertia reel case (12).

(9) Remove pin and base assembly (2) and spring (3) from spring and drum assembly (4).

(10) Cut cable stop (6) and remove spring and drum assembly (4) from inertia reel cable (7).

(11) Pull inertia reel cable (7) from inertia reel case (12).

(12) Disconnect extension spring (29) at end of drum lever (16). Drill out rivets (33) and remove cable clip (32) from cable bracket (31).

(13) Remove nut (30), screw (18), and control cable assembly (23) from cable bracket (31). Remove extension spring (29) from control cable assembly (23).

(14) Cut cable stop (24) and remove cable from cable casing of control cable assembly (23) to remove compression spring (27).

NOTE

Do not remove compression spring (27) unless replacement is necessary.

(15) Drill out rivets (17) and remove cable bracket (31) from inertia reel case (12).

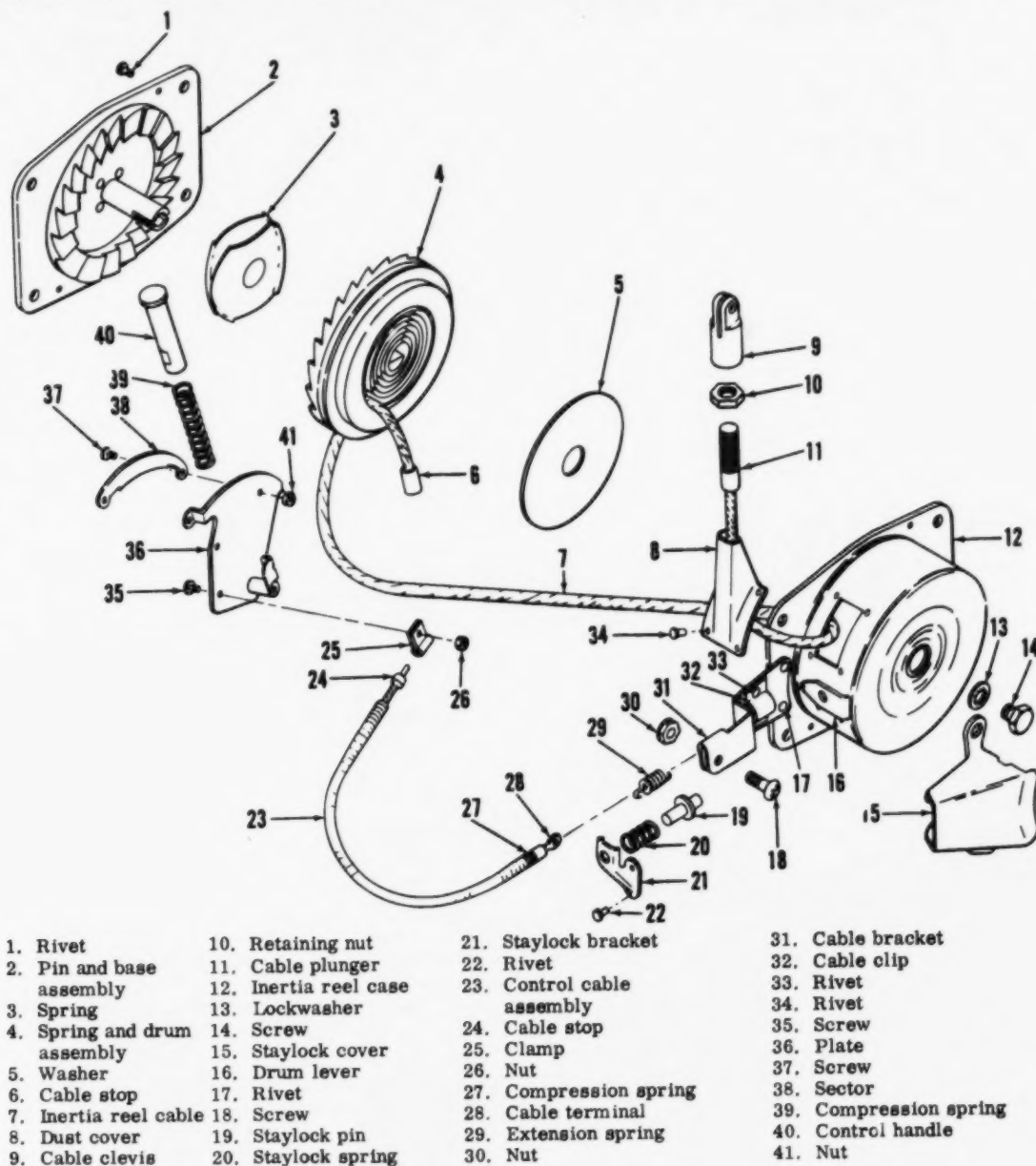


Figure 4-15. Inertia reel assembly

(16) Drill out rivets (22) and remove staylock bracket (21), staylock spring (20), staylock pin (19), and drum lever (16) from inertia reel case (12).

(17) Drill out rivets (34) and remove dust cover (8) from inertia reel case (12).

NOTE

Cable plunger (11) and cable terminal (28) are swaged on their respective cables and are to be removed only when replacement is necessary.

c. Cleaning. Wash all parts of inertia reel assembly, except cable, with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

d. Inspection (1) Inspect inertia reel cable for frayed cable strands and corrosion; cable terminal for burred or stripped threads.

(2) Inspect control cable assembly for crimped or stretched cable casing; cable for broken or frayed cable strands and corrosion; cable plunger for cracks or elongated holes.

(3) Inspect pin and base assembly for cracked housing and elongated holes; ratchet teeth for nicks and excessive wear.

(4) Inspect all springs for cracks and evidence of tension weakness.

(5) Inspect spring and drum assembly for cracked, nicked, or excessively worn drum and ratchet teeth.

(6) Inspect inertia reel case for cracks, dents, distortion, and elongated holes.

(7) Inspect staylock cover, cable bracket, staylock bracket, drum lever, and dust cover for bends, cracks, dents, and elongated holes.

(8) Inspect staylock pin for burrs and excessive wear.

e. Repair or replacement. (1) Replace broken or defective parts.

(2) Replace inertia reel cable (7, figure 4-15) having frayed cable strands, corrosion, or other damage as follows:

(a) Using suitable replacement cable, cut to required length and trim both free ends.

(b) Swage new cable terminal (28) on one end of replacement cable, and check for correct length, using old inertia reel cable (7) as a guide.

(3) Replace cable of control cable assembly (23) at each disassembly as follows:

(a) Using suitable replacement cable, cut to required length and tin both free ends.

(b) Swage new cable plunger (11) on one end of replacement cable, and check for correct length, using old cable as a guide.

f. Reassembly. (1) Check cable plunger (11, figure 4-15) and cable terminal (28) for proper swaging to their respective cables before reassembly.

NOTE

Lubricate moving parts of inertia reel assembly with grease (item 62, table 1-8) before reassembly.

(2) Position dust cover (8) on inertia reel case (12) and secure with rivets (34).

(3) Position drum lever (16), staylock pin (19), staylock spring (20), and staylock bracket (21) on inertia reel case (12) and secure with rivets (22).

(4) Position cable bracket (31) on inertia reel case (12) and secure with rivets (17).

(5) If removed, install compression spring (27) on cable of control cable assembly (23). Insert cable through cable casing and swage new cable stop (24) on free end of cable.

(6) Connect extension spring (29) to end of control cable.

(7) Insert control cable assembly (23) into cable bracket (31), properly position, and secure with screw (18) and nut (30).

(8) Position cable clip (32) on cable bracket (31) and secure with rivets (33). Connect extension spring (29) at drum lever (16).

NOTE

Approximately 1/4-inch adjustment of the control cable may be made at the cable bracket (31) by loosening nut (30) and screw (18).

(9) Insert unswaged end of inertia reel cable (7) through dust cover (8) and inertia reel case (12).

(10) Insert unswaged end of inertia reel cable (7) through opening in spring and drum assembly (4) and swage new cable stop (6) on unswaged end of inertia reel cable.

(11) Position pin and base assembly (2) on level surface and install spring (3) over pin, in pin and base assembly.

(12) Install spring and drum assembly (4) on pin and base assembly (2), allowing tang of spring to drop into slot in pin.

(13) Position washer (5) on spring and drum assembly (4) and slide inertia reel case (12) along inertia reel cable (7) until positioned on pin and base assembly (2).

NOTE

If the inertia reel case fails to seat on the pin and base assembly, pull out on the drum lever to seat inertia reel case.

(14) Position lockwasher (13) on inertia reel case (12) and start screw (14) (approximately two threads). Inertia reel is now ready for loading.

(15) Load spring and drum assembly (4) so that inertia reel cable (7) will retract fully into inertia reel case as follows:

(a) With pin and base assembly (2) in left hand and inertia reel case (12) in right hand, rotate inertia reel case approximately 3-1/2 complete turns in clockwise direction with pin and base assembly and inertia reel case mounting holes aligned.

(b) Temporarily insert a bolt or pin in forward right-hand and rear left-hand mounting holes. Tighten screw (14).

(c) Position staylock cover (15) on inertia reel case (12) and secure pin and base assembly (2), inertia reel case (12), and staylock cover (15) with rivets (1). Remove alignment bolts or pins.

(16) Insert compression spring (39) in tubular recess in plate (36). Position control handle (40) over compression spring and carefully compress into tubular recess.

(17) With control handle (40) compressed and positioned, insert sector (38) in slot of control handle and install screws (37) and nuts (41) in sector and plate (36).

(18) Install clamp (25) on free end of control cable assembly (23), position clamp on plate (36), and secure with screw (35) and nut (26).

g. Installation. (1) Accomplish maintenance operational check in accordance with step i below prior to installation of inertia reel assembly.

(2) Position inertia reel assembly (14, figure 4-10) on mounting bracket and install bolts, washers, and nuts (15).

(3) Position shoulder harness assembly (2) over seat back and secure shoulder harness fitting (21) to inertia reel cable clevis (19) with bolt, washer, and nut (20).

NOTE

If a new cable has been installed, it may be necessary to cut off excess cable housing. If so, leave an excess of 1 inch of cable in case adjustment is necessary.

(4) Route and secure control cable housing through clamps on side of seat structure.

(5) Position and secure control cable housing in clamp at control quadrant.

(6) Place control handle (40, figure 4-15) in unlocked position (full aft), attach cable stop (24) on control cable as close to control handle as possible, and tighten cable stop retaining screw.

(7) Adjust inertia reel assembly in accordance with paragraph h below.

(8) Install seat cushions in accordance with paragraph 4-57, 4-60, and 4-63.

h. Adjustment. (1) Place control handle in unlocked position (full aft), then pull shoulder harness up and down to check for freedom of movement. If movement is jerky, relocate the cable housing in control quadrant until trouble is eliminated.

(2) Pull shoulder harness forward as far as possible and place control handle in locked position (full forward).

(3) Allow spring to pull harness back one notch at a time. Try to overcome locking action of inertia reel assembly. If harness can be pulled forward, inertial reel assembly is not locking properly and control cable and housing must be repositioned in clamp at control quadrant.

(4) After adjustment is complete operate control handle several times and check cable stop for slippage. Secure retaining screw on cable stop with lock wire.

i. Maintenance operational check. (1) Grasp control bracket of assembled inertia reel assembly in the right hand and extend harness cable with left hand.

(2) Swing reel assembly downward and stop suddenly. This movement should lock reel assembly and engage staylock pin.

(3) Release staylock by pulling end of drum lever outward and releasing at original position.

(4) Extend harness cable several times and allow cable to retract into reel assembly. Operation should be free and without clicking noise.

(5) Installed inertia reel can be checked for locking by tapping inertia reel housing with rubber mallet to create a 2G force impact.

4-69. UPHOLSTERY.(U-8D, RU8D)

4-70. The aircraft interior is upholstered in high quality leather and fabric material. The sides of the cabin compartment are upholstered with two panels on each side. The front panel extends from the front seat forward, while the aft panel extends from the front seat aft to the baggage compartment

bulkhead. The cabin compartment ceiling is covered with three panels extending the length of the compartment. The cabin compartment door is upholstered with one panel which incorporates an armrest. The instrument panel deck and glare shield are upholstered and padded to provide protection for the front seat occupants.

4-71. SIDE UPHOLSTERY PANELS. Each side of the cabin compartment is upholstered with two panels.

a. Removal. (1) Remove armrests in accordance with paragraph 4-78.

(2) Remove seats in accordance with paragraphs 4-57, 4-60, and 4-63.

(3) With a screwdriver or similar tool pry clips loose from structure and remove aft panel from aircraft.

(4) Remove screws securing front panel and remove panel.

b. Cleaning. Clean upholstery panels in accordance with paragraph 1-159.

c. Inspection. (1) Inspect upholstery panels for fraying, rips, and worn spots.

(2) Inspect fasteners for condition.

d. Installation. (1) Position front panel and install retaining screws.

(2) Position panel and secure panel clips.

(3) Install seats in accordance with paragraphs 4-57, 4-60, and 4-63.

(4) Install armrests in accordance with paragraph 4-78.

4-72. CEILING UPHOLSTERY PANELS. The ceiling of the cabin compartment is upholstered with three panels.

a. Removal. (1) Remove overhead light panels in accordance with paragraph 12-225.

(2) Remove oxygen control console in accordance with paragraph 11-97, steps a through f.

(3) Pull center ceiling panel loose and remove from aircraft.

(4) Pull left and right ceiling panels down, then push aft, and remove from aircraft.

b. Cleaning. Clean upholstery panels in accordance with paragraph 1-159.

c. Inspection. Inspect upholstery panels for fraying, rips and worn spots.

d. Installation. (1) Position left and right ceiling panels and secure clips.

(2) Position center ceiling panel and secure clips.

(3) Install oxygen control console in accordance with paragraph 11-97, steps f through h.

(4) Install overhead light panels in accordance with paragraph 12-225.

4-73. CABIN COMPARTMENT DOOR UPHOLSTERY PANEL. The armrest on the cabin compartment door is incorporated into the upholstery panel.

a. Removal. (1) Remove screws securing door handle plate and remove plate. (2) Pull upholstery panel clips from door and remove upholstery panel.

b. Cleaning. Clean upholstery panel in accordance with paragraph 1-159.

c. Inspection. Inspect upholstery panel for fraying, rips, worn spots.

d. Installation. (1) Position upholstery panel and secure clips.

(2) Position door handle plate and secure with screws.

4-74. INSTRUMENT PANEL DECK AND GLARE SHIELD. The instrument panel is provided with a deck that provides access to the back of the instrument panel, and a glare shield for the instruments. The panel deck and glare shield are upholstered and padded to provide protection for the front seat occupants.

a. Removal. (1) Remove screws securing padded glare shield to instrument panel deck, and remove glare shield.

(2) Remove screws from each of three top instrument panel shock mounts, then tilt top of instrument panel aft.

(3) Remove lower row of screws from exterior of all windshield panels.

(4) Remove instrument panel deck.

b. Cleaning. Clean instrument panel deck and glare shield in accordance with paragraph 1-159.

c. Inspection. (1) Inspect deck and glare shield for cuts, tears, and distortion.

(2) Inspect mounting holes for elongation and attaching bolts and nuts for condition.

d. Installation. (1) Position instrument panel deck and secure with screws installed through lower exterior portions of all windshield panels.

(2) Push instrument panel forward and install screws in each of the three top instrument panel shock mounts.

(3) Position padded glare shield on instrument panel deck and secure with screws.

4-75. CURTAINS.(U-8D, RU-8D)

4-76. Draw curtains are provided on the center windows and the rear quarter windows to reduce sun glare in the rear passenger seat of the aircraft.

a. Removal. (1) Remove center window curtains as follows:

- (a) Unsnap draw strings from windowframe.
- (b) Pull top rod straight out and free of mounting pins.
- (c) Unhook bottom rod from hooks.
- (d) Slide rods out of curtains.
- (e) Untie knot in draw strings where strings extend through curtain. Pull strings from curtain.
- (2) Remove rear quarter window curtains as follows:
 - (a) Remove screws attaching each rod to window frame, then remove curtain and rods.
 - (b) Slide rods out of curtain.
- b. Cleaning. Clean curtain fabric in accordance with paragraph 1-159.
- c. Inspection. Inspect curtains for fraying, tears, and condition of stitching.
- d. Installation. (1) Install center window curtains as follows:
 - (a) Insert draw string through curtain using a wire loop to work string through. Tie a knot in end of each string large enough so that it will not slip through ferrule in curtain.
 - (b) Insert rods through curtains.
 - (c) Hook bottom rod over hooks on window frame.
 - (d) Slide top rod straight onto mounting pins.
 - (e) Pull draw strings and snap them to window frame.
- (2) Install rear quarter window curtains as follows:
 - (a) Insert rods in curtain.
 - (b) Position rods on window frame and install screws at each end of rod.

4-77. ARMRESTS. (U-8D, RU-8D)

- 4-78. Armrests attached to the fuselage sidewall are provided on each side of the rear passenger seat and to the left of the pilot's seat. An armrest is provided on the cabin compartment door and is an integral part of the door upholstery panel.
- a. Removal. (1) Remove pilot's armrest as follows:
 - (a) Open door on armrest and remove bolts and wing bolts securing armrest to fuselage.
 - (b) Remove armrest.
 - (2) Remove rear passenger seat armrests as follows:
 - (a) Slide armrest forward approximately 1/2-inch and pull out.
 - (b) Disconnect cigarette lighter wire at disconnect splice and remove armrest.
 - b. Cleaning. Clean armrest upholstery in accordance with paragraph 1-159.

- c. Inspection. Inspect armrest upholstery for fraying, cuts, and condition of stitching.

d. Installation. (1) Install pilot's armrest as follows:

- (a) Position armrest and install bolts at bottom and wing bolts at top inside armrest door.
- (b) Adjust armrest to proper height, hook wing bolts in slots provided and tighten wing bolts.

(2) Install rear passenger seat armrests as follows:

- (a) Connect cigarette lighter wire at disconnect splice.
- (b) Position armrest over mounting screws, push in on armrest, and slide aft until armrest is secured.

4-79. SUNVISORS. (U-8D, RU-8D)

4-80. The cabin compartment is equipped with sunvisors located near the upper outside corner of each windshield. The sunvisors will rotate horizontally and vertically and will slide out on the mounting shafts to extend beyond the center of the windshield.

- a. Removal. (1) Remove screw which retains and adjusts tension on mounting shaft, and pull sunvisor from mounting bracket.

NOTE

The sunvisor can be pulled off mounting shaft without removing mounting bracket or shaft.

- (2) Rotate mounting bracket to align hole in mounting bracket with each of three attaching screws. Remove screws and remove bracket.
- b. Cleaning. (1) Clean sunvisor upholstery in accordance with paragraph 1-159.

(2) Clean metal parts of sunvisor with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

- c. Inspection. (1) Inspect mounting bracket and shaft for cracks or bends and attaching screws for condition of threads.

(2) Inspect sunvisor upholstery for tears, cuts, and condition of stitching.

d. Installation. (1) Position mounting bracket and align hole in mounting bracket with one attaching screw hole.

(2) Install one screw.

(3) Rotate mounting bracket and install remaining screws.

(4) Insert mounting shaft in bracket and install retaining screw.

NOTE

Tighten screw enough to hold sunvisor in any position, yet loose enough to allow the sunvisor to be moved easily.

4-81. CARPETING. (U-8D, RU-8D)

4-82. The aircraft is carpeted with a durable, tightly woven carpet. The carpet sections are secured to the floorboards by snap-type fasteners or cement. A curon pad is installed under each carpet section to cushion the carpet. This pad also serves to reduce floor vibration and to lengthen carpet life.

a. Removal. (1) Remove carpeting secured by fasteners as follows:

(a) Remove screws that secure any placards in place on aircraft floor.

(b) Unsnap fasteners on section of carpet to be removed, and remove carpet.

(c) Remove curon pad from aircraft.

NOTE

If the carpets and pads are to be removed from the aircraft for any length of time, wrap them in a paper or cloth wrapping to keep them clean. Store in a clean, dry area.

(2) Remove carpeting secured by cement as follows:

(a) Pry a corner loose on carpet to be removed.

(b) Using pliers if necessary, grip loose corner of carpet, and by careful use of a knife, putty knife, or similar tool, separate the carpet from the floorboards, using extreme care to avoid damaging the carpet.

b. Cleaning. Clean carpeting in accordance with paragraph 1-159.

c. Inspection. (1) Inspect carpeting for fraying, tears, and threadbare areas.

(2) Inspect snap fasteners for security and condition.

d. Installation. (1) Install carpeting secured by fasteners as follows:

(a) Place curon pad in position on floorboard.

(b) Snap carpet section in place.

(c) Install screws securing placards to floor.

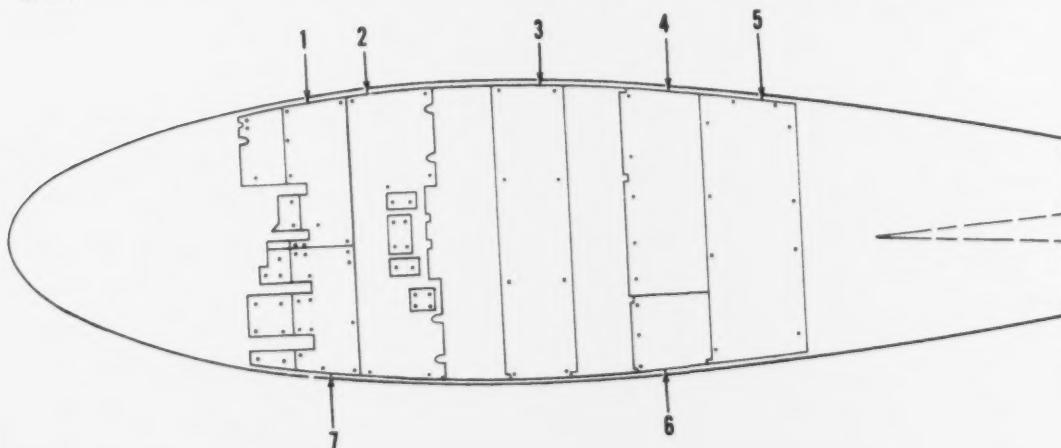
(2) Install carpeting secured by cement as follows:

(a) Remove all old cement from floorboard.

(b) Coat back of carpet to be installed with cement (item 76, table 1-8). Press carpeting firmly in place when cement becomes tacky.

4-83. FLOORBOARDS. (U-8D, RU-8D)

4-84. The floorboard installation (figure 4-16) consists of 1/4-inch plywood forward and aft



1. Right forward flight compartment floorboard assy.
2. Center flight compartment floorboard assy.
3. Aft flight compartment floorboard assy.
4. Right forward baggage compartment floorboard assy.
5. Aft baggage compartment floorboard assy.
6. Left forward baggage compartment floorboard assy.
7. Left forward flight compartment floorboard assy.

Figure 4-16. Floorboard installation (U-8D and RU-8D)

baggage compartment floorboard assemblies, 1/4-inch plywood center and aft cabin compartment floorboard assemblies, and sheet aluminum forward cabin compartment floorboard assemblies.

a. Removal. (1) Remove carpeting from floorboard assembly to be removed in accordance with paragraph 4-82.

(2) Remove screws and washers securing floorboard assembly to airframe structure.

(3) Remove floorboard assembly from aircraft.

b. Cleaning. Clean floorboard assembly with soap (item 23, table 1-8) and water, and allow floorboard to dry.

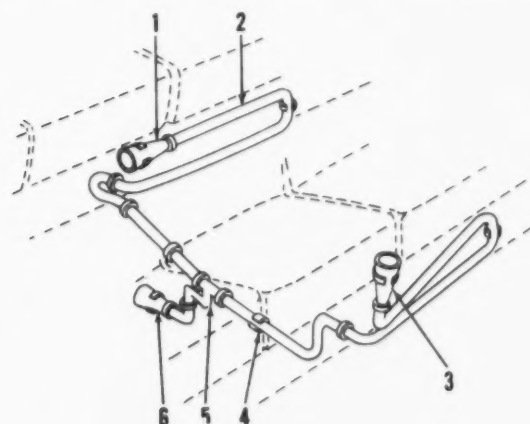
c. Inspection. (1) Inspect floorboard assembly for cracks, separation, and excessive wear. (2) Inspect attaching screws for condition of threads.

d. Installation. (1) Position floorboard assembly in aircraft and secure with screws and washers.

(2) Install carpeting in accordance with paragraph 4-82.

4-85. RELIEF TUBE ASSEMBLY. (U-8D, RU-8D)

4-86. The relief tube assembly (figure 4-17) consists of relief tubes located beneath the front and rear seats which are connected to



- | | |
|--------------------------|-------------------|
| 1. Passenger relief horn | 4. Retaining clip |
| 2. Tube | 5. Y Fitting |
| 3. Pilot's relief horn | 6. Venturi |

Figure 4-17. Relief tube assembly (U-8D, U-8G, and RU-8D)

the venturi outlet by a Y-fitting beneath the aft flight compartment floorboard assembly.

a. Removal. (1) Remove copilot's seat bottom cushion.

(2) Remove rear passenger seat in accordance with paragraph 4-63.

(3) Remove aft flight compartment floorboard in accordance with paragraph 4-84.

(4) Remove left access plate located on front seat mounting structure, below copilot's seat cushion.

(5) Remove tape and lock wire from ends of tubes (2, figure 4-17) and detach tubes from relief horns (1 and 3), Y-fitting (5), and venturi (6).

(6) Open retaining clips (4) and remove relief tube assembly from aircraft.

b. Cleaning. Clean relief tube assembly in accordance with paragraph 1-163.

c. Inspection. (1) Inspect tubes for cuts, cracks, and deterioration.

(2) Inspect relief horns, Y-fitting and venturi for cracks.

(3) Check tube retaining clips for security.

d. Installation. (1) Position tubes (2, figure 4-17) and secure with retaining clips (4).

(2) Connect tubes (2) to relief horns (1 and 3), Y-fitting (5), and venturi (6) and secure with lock wire.

NOTE

Tubes are to be installed free of traps and kinks.

(3) Wrap tubing at points of friction and at all joints with insulation tape (item 53, table 1-8), then coat with shellac (item 78, table 1-8).

(4) Position and secure left access plate on front seat mounting structure beneath copilot's seat.

(5) Install aft cabin compartment floorboard assembly in accordance with paragraph 4-84.

(6) Install rear passenger seat in accordance with paragraph 4-63.

(7) Install copilot's seat bottom cushion.

4-87. FIRST AID KITS. (U-8D, RU-8D)

4-88. The aircraft is equipped with two first aid kits which are secured to mounting studs with snap fasteners. One first aid kit is located on the fuselage wall forward of the baggage compartment door, and the other first aid kit is located on the fuselage wall beneath the right side of the instrument panel.

4-89. BAGGAGE COMPARTMENT. (U-8D, RU-8D)

4-90. The baggage compartment is located aft of the flight compartment and has a structural capacity of 300 pounds. Access to the compartment is provided by a door on the right side of the aircraft. The baggage compartment is upholstered and is equipped with a coatrack, carpeting and removable floorboards.

4-91. BAGGAGE COMPARTMENT DOOR. (U-8D, RU-8D)

4-92. The baggage compartment door (figure 4-18) is fabricated of aluminum alloy channel-type frame work and covered with a sheet aluminum skin. A key-operated latch and a rubber seal provide maximum security for the compartment. A continuous piano-type hinge secures the door to the baggage compartment. The door is held in the full open position by a door stop.

a. Removal. (1) Remove bolt (14, figure 4-18), washer (11), and nut (10) securing stop rod (13) to door (4), and remove stop rod.

(2) Remove screw (1) securing hinge pin (2) then remove hinge pin and door (4).

b. Cleaning. Clean baggage compartment door in accordance with paragraph 1-159.

c. Inspection. (1) Inspect hinge halves for cracks, bends, or excessive wear.

(2) Inspect door seal for proper adhesion, deterioration, and cuts.

(3) Inspect latch for proper operation, cracks, and bends.

d. Installation. (1) Position door (4, figure 4-18), insert hinge pin (2), and secure with screw (1).

(2) Position stop rod (13) on door (4) and secure with bolt (14), washer (11), and nut (10).

4-93. BAGGAGE COMPARTMENT DOOR LATCH. The baggage compartment door latch is key-operated and fits flush with the door skin when it is locked.

a. Removal. (1) Remove setscrew (19, figure 4-18) from latch handle (18).

(2) Rotate latch handle (18) and withdraw handle and lock (20) from blade assembly (17).

(3) Remove screws (7) from latch cover (6) and remove latch cover.

(4) Remove screws (16) from plate assembly (15) and remove plate assembly and blade assembly (17).

b. Cleaning. Clean each part of door latch with solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. (1) Inspect all parts for cracks, bends, or distortion.

(2) Inspect mounting holes for cracks or elongation.

d. Installation. (1) Position blade assembly (17, figure 4-18) in plate assembly (15) and secure plate assembly to door (4) with screws (16).

(2) Install lock (20) through latch handle (18); position latch handle and secure with setscrew (16).

(3) Position latch cover (6) and secure with screws (7).

4-94. BAGGAGE COMPARTMENT DOOR SEAL. The rubber seal around the baggage compartment door edge prevents water leakage, serves as a vibration damper, and buffers closing impact of the door.

a. Removal. Pull damaged or distorted seal from door.

b. Cleaning. Clean surface to which seal is to be attached with toluene (item 73, table 1-8), and dry with a clean, lint-free cloth.

c. Inspection. Inspect surface to which seal is to be attached for distortion and corrosion.

d. Installation. (1) Apply a coat of primer (item 74, table 1-8) to cleaned surface and allow to dry 30 minutes.

(2) Apply one coat of cement (item 75, table 1-8) to primed surface, and two coats of cement to underside of rubber seal. Allow approximately 20 minutes drying time between cement applications to the rubber seal.

(3) Press seal in place around edge of door when cement becomes tacky but will not transfer to knuckle.

4-95. BAGGAGE COMPARTMENT DOOR HINGE. A hinge is provided for support and ease of opening of the baggage compartment door.

a. Removal. (1) Remove baggage compartment door in accordance with paragraph 4-91.

(2) Drill out rivets from hinge and remove hinge.

b. Cleaning. Clean hinge with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. (1) Inspect mounting holes for cracks and elongation.

(2) Inspect hinge for cracks and bends.

d. Installation. (1) Position hinge and secure with rivets.

(2) Install door in accordance with paragraph 4-92.

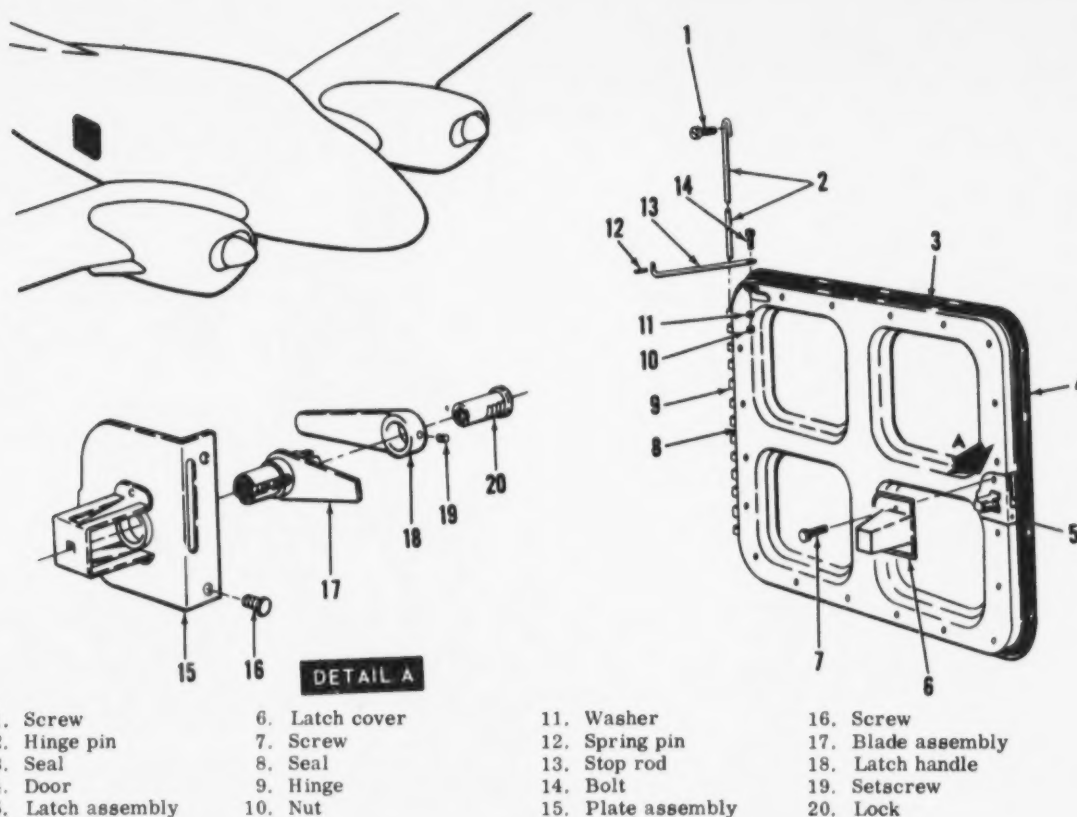


Figure 4-18. Baggage compartment door (U-8D and RU-8D)

4-96. BAGGAGE COMPARTMENT UPHOLSTERY.(U-8-D, RU-8D)

4-97. The baggage compartment and baggage compartment door are upholstered with fabric panels.

a. Removal. Remove screws securing upholstery panels and remove panels.

b. Cleaning. Clean upholstery in accordance with paragraph 1-159.

c. Inspection. Inspect upholstery for fraying, tears, and condition of stitching.

d. Installation. Position upholstery panels and secure with screws.

4-98. BAGGAGE COMPARTMENT CARPETING.(U-8D, RU-8D)

4-99. The baggage compartment floor is covered with durable, tightly woven carpet sections. Maintenance of the baggage compartment carpeting is accomplished in accordance with paragraph 4-81.

4-100. BAGGAGE COMPARTMENT FLOORBOARDS.(U-8D, RU-8D)

4-101. Refer to paragraph 4-84 for floorboard removal and installation.

4-102. COATRACK.(U-8D, RU-8D)

4-103. A coatrack is installed in the baggage compartment and secured to the forward and aft bulkhead of the compartment.

a. Removal. (1) Remove screws attaching aft fuselage access panel to baggage compartment aft bulkhead. Remove panel.

(2) Remove bolts attaching coatrack and clip to forward bulkhead of baggage compartment.

(3) Remove, from inside aft fuselage section, bolts attaching coatrack and clip to rear bulkhead of baggage compartment.

(4) Pull coatrack straight forward from inside

flight compartment and remove from aircraft.

b. Cleaning. Clean coatrack with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8) and wipe dry with a clean, dry cloth.

c. Inspection. Inspect coatrack for cracks, bends, and elongation of mounting holes.

d. Installation. (1) Insert straight end of coatrack from inside of flight compartment through hole in forward bulkhead of baggage compartment.

(2) Insert end of coatrack through aft bulkhead of baggage compartment from inside baggage compartment.

(3) Turn coatrack so that screws are to the top.

(4) Install long bolt through clip, coatrack, and forward bulkhead of baggage compartment.

(5) Install short bolts through clip and bulkhead.

(6) Install, from inside aft fuselage section, bolts attaching clip and coatrack to bulkhead.

(7) Install aft fuselage access panel on baggage compartment aft bulkhead and secure with screws.

4-104. CABIN COMPARTMENT. (U-8G)

4-105. The cabin compartment provides seating accommodations for a pilot, copilot, and four passengers. The passenger seats are equipped with seat belts, while the pilot and copilot seats are equipped with seat belts and shoulder harnesses. The shoulder harnesses are attached to automatic inertia reels. Entrance to the cabin compartment is provided by an airstair door on the right side of the fuselage. The cabin compartment is provided with acrylic plastic windshield and window assemblies. The cabin compartment is also furnished with upholstery, curtains, arm rests, sun-visors, carpeting, floorboards, relief tube assembly, and first aid kits.

4-106. CABIN COMPARTMENT DOOR (U-8G)

4-107. The cabin compartment door is located on the right side of the fuselage, aft of the wing trailing edge. Stair steps are built into the door to provide quick and easy access to the aircraft interior. A plastic covered cable, located on the aft edge of the door, provides an assist rail for entry and exit as well as supporting the door in the open position. The door may be opened from either side by the latch handles. A key-operated locking mechanism is incorporated in the exterior latch handle. The door is hinged at the

bottom by a continuous piano-type hinge along the width of the door. A rubber seal is installed over the hinge and around the door to prevent cold air and water from entering the cabin compartment.

a. Removal. (1) Support door. Remove nut (1, figure 4-19) and bolt (2) from cable support (3) to release cable support from door.

(2) Remove nut (4) and bolt (5) from pivot assembly (6) to release cable assembly (7) from pivot assembly on door.

(3) Lift door slightly; remove hinge pin (8) from hinge (9) to release door from fuselage.

(4) Remove nut (10) and bolt (11) securing cable assembly (12) to cable bracket (13) on fuselage structure.

b. Cleaning. Clean the cabin compartment door in accordance with paragraph 1-159.

c. Inspection. (1) Inspect door latching mechanism for proper operation.

(2) Inspect door hinge for cracks and damage to rivets.

(3) Inspect door seal for deterioration and cuts.

(4) Inspect cable and plastic cover for damage.

d. Installation. (1) Position door assembly on fuselage; align halves of hinge (9) and secure with hinge pin (8).

(2) Secure cable assembly (12) to cable bracket (13) with bolt (11) and nut (10).

(3) Secure cable support (3) to door with bolt (2) and nut (1).

(4) Secure cable assembly (7) to pivot assembly (6) with bolt (5) and nut (4).

4-108. WINDSHIELD. (U-8G)

4-109. The three-piece, acrylic plastic windshield in the U-8G is the same as the windshield provided for the U-8D and RU-8D. Refer to paragraph 4-43 for maintenance of the windshield.

4-110. WINDOWS. (U-8G)

4-111. The U-8G aircraft is provided with three acrylic plastic windows on the right side of the fuselage and four acrylic plastic windows on the left side of the fuselage. The windows on the right side and the three forward windows on the left side are identical to the windows installed in the U-8D and RU-8D. Maintenance of these windows is performed in accordance with paragraph 4-45. The aft side window on the left side of the fuselage is common only to the U-8G. The window does not open and is riveted to the aircraft structure. Maintenance of the window is performed as follows:

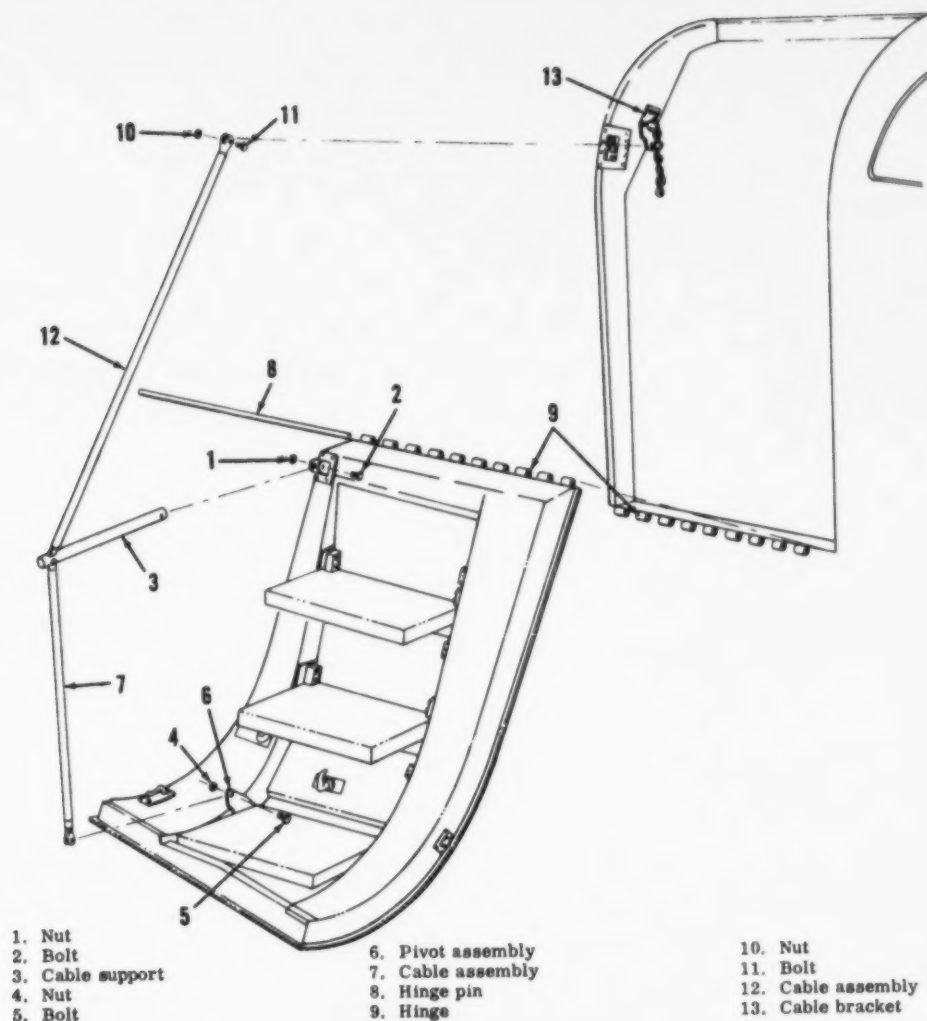


Figure 4-19. Cabin compartment door (U-8G)

- a. **Cleaning.** Clean the aft side window in accordance with paragraph 1-159.
- b. **Inspection.** Inspect the aft side window for cracks, crazing, and discoloration.

ing accommodations for six people, including the pilot and copilot. The seats are mounted on parallel tracks and are separated by a center aisle.

4-112. SEATS. (U-8G)

4-113. The U-8G aircraft is provided with seat-

4-114. PILOT'S AND COPILOT'S SEATS. The pilot's and copilot's seats are constructed of tubular steel and aluminum frames. The seats

are provided with upholstery covered polyurethane cushions. The center aisle separates the pilot's and copilot's seats. The seats can be adjusted fore and aft and are equipped with shoulder harnesses and seat belts. The fore and aft adjustment is located on the center leg beneath the front seat cushion on each seat. Pulling up on the chair adjustment fitting disengages the lock from the mounting track and allows the seat to move forward and aft.

a. Removal. (1) Lift adjustment fitting (1, figure 4-20) on center leg of seat and rotate 90 degrees in either direction.

(2) Move seat either forward or aft until seat base fittings align with circular cutouts in mounting track.

(3) Lift seat from mounting track.

b. Cleaning. (1) Clean metal parts of seat with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8) and wipe dry with a clean dry cloth.

(2) Clean upholstery in accordance with paragraph 1-159.

c. Inspection. (1) Inspect metal parts of seats for cracks or bends.

(2) Inspect upholstery for fraying, cuts, or loose stitching.

(3) Inspect seat tracks for cracks and security of installation.

d. Installation. (1) Align seat base fittings with circular cutouts in mounting tracks.

(2) Lift adjustment fitting (1) on center leg of seat and lower seat into mounting tracks.

(3) Release adjustment fitting and move seat either forward or aft until seat locks into place.

4-115. PILOT'S AND COPILOT'S SEAT UPHOLSTERY. The pilot's and copilot's seats are equipped with upholstered polyurethane cushions.

a. Removal. (1) Remove seats from aircraft in accordance with paragraph 4-114.

(2) Remove nuts (2, figure 4-20), washer (3), bolts (4), and remove arm rests (5) from seat.

(3) Remove screws (6) and shoulder harness hold-down strap (7) from top of back frame (8).

(4) Remove screws (9) and washers (10) securing upholstered stiffener (11) to back of seat. Remove stiffener.

(5) Pull cemented back cushion (12) from back frame (8).

(6) Remove screws (13) and washers (14) securing seat cushion (15) to seat frame (16).

(7) Pull cemented seat cushion (15) from seat frame (16).

NOTE

Use care to avoid tearing cushion.

b. Cleaning. Clean seat covers in accordance with paragraph 1-159.

c. Inspection. (1) Inspect seat covers for fraying, tears, and loose stitching.

(2) Inspect cushions for wear or visible damage.

d. Installation. (1) Apply cement (item 76, table 1-8) to both sides of back frame (8, figure 4-20) and place back cushion (12) in place on frame.

(2) Put stiffener (11) in place and secure with screws (9) and washers (10).

(3) Place shoulder harness hold down strap (7) on seat back and secure with screws (6).

(4) Apply cement (item 76, table 1-8) to both sides of seat frame (16) and place seat cushion (15) in place on frame.

(5) Secure cushion (15) to frame (16) with screws (13) and washers (14).

(6) Secure arm rest(s) assembly (5) in place with bolts (4), washers (3), and nuts (2).

(7) Install seat in accordance with paragraph 4-114.

4-116. FORE AND AFT SEAT ADJUSTMENT FITTING. Fore and aft seat adjustment is provided by a fitting (1, figure 4-20) located on the center leg of the seat.

a. Removal. (1) Remove seat in accordance with paragraph 4-114.

(2) Remove nut (17), washer (18), and bolt (19). Remove fitting from center leg of seat.

b. Cleaning. Clean parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect parts for cracks and wear.

d. Installation. (1) Install fitting to center leg of seat and secure with bolt (19), washer (18), and nut (17).

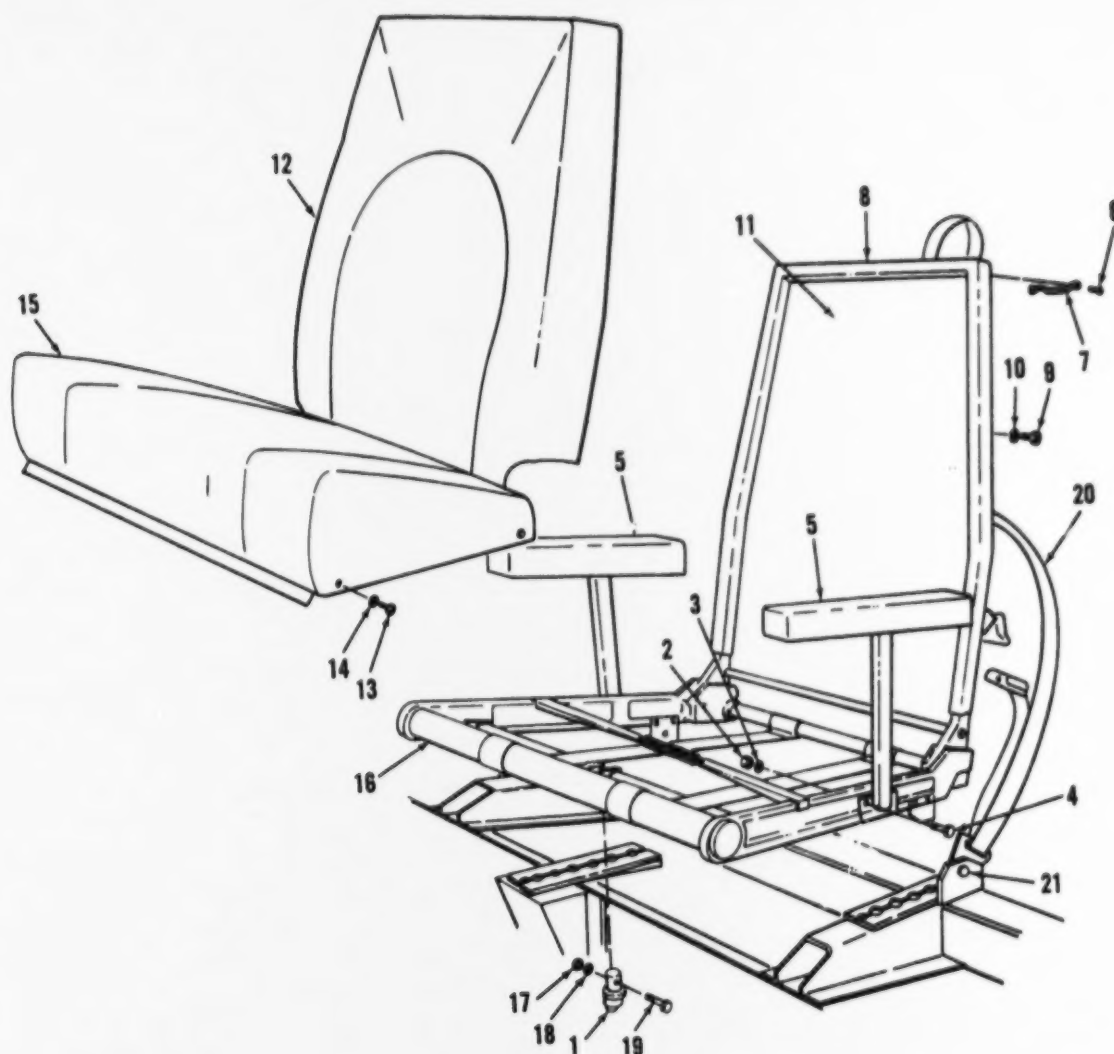
(2) Install seat in accordance with paragraph 4-114.

4-117. ARMRESTS. The pilot's and copilot's seats are equipped with left and right armrests.

a. Removal. (1) Remove armrests in accordance with paragraph 4-78.

NOTE

Use care to avoid tearing cushion.



1. Adjustment fitting
2. Nut
3. Washer
4. Bolt
5. Armrest
6. Screw
7. Retaining strap

8. Back frame
9. Screw
10. Washer
11. Stiffener
12. Seat back
13. Screw
14. Washer

15. Seat cushion
16. Seat frame
17. Nut
18. Washer
19. Bolt
20. Shoulder harness - seat belt strap
21. Bolt

Figure 4-20. Pilot's and copilot's seat (U-8G)

(2) Remove upholstered pad by pulling cemented edges loose from under armrest.

b. Cleaning. (1) Clean metal parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

(2) Clean upholstered pad in accordance with paragraph 1-159.

c. Inspection. (1) Inspect upholstered pad for tears, cuts, and worn areas.

d. Installation. (1) Position upholstered pad over armrest and secure edges to undersides of armrest with cement (item 76, table 1-8).

(2) Install armrests in accordance with paragraph 4-78.

4-118. PILOT'S AND COPILOT'S SHOULDER HARNESS AND SEATBELT. The pilot's and copilot's seats are equipped with a strap that serves as a shoulder harness and seatbelt. This strap restrains the forward movement of the occupant in the event of bad weather, sudden deceleration, or a crash landing. The straps are secured to the mounting track of the seats and to a bolt located on the seat back.

a. Removal. (1) Unclip strap (20, figure 4-20) from bolts (21).

(2) Remove screws (6) and remove retaining strap (7).

(3) Remove strap (20).

b. Cleaning. Clean in accordance with TM 55-405-3.

c. Inspection. (1) Inspect webbing for fraying, cuts, and broken stitching.

(2) Inspect buckle for proper operation.

(3) Inspect fitting and clamps for cracks.

d. Installation. (1) Position strap (20) over seat.

(2) Clip strap (20 to bolts (21).

(3) Position retaining strap (7) and secure with screws (6).

4-119. INERTIA REEL ASSEMBLY. The pilot's and copilot's seats are provided with inertia reel assemblies attached to the main spar web behind each seat. Each inertia reel is controlled by a two-position lever in a control quadrant located on the left forward edge of each seat. A flexible cable and housing assembly links each control handle to its respective inertia reel. A spring-loaded latch in the end of the handle locks the handle in either selected position. When the handle is unlocked (aft), the inertia reel maintains a slight tension on the harness, but permits the pilot or copilot to lean forward to reach the controls. When the handle is moved to the locked (forward) position,

the inertia reel locks the harness in successive positions as the occupant leans back. Before the inertia reel can be unlocked, all tension must be removed from the harness by leaning full back in the seat. If the handle is in the unlocked (aft) position, an impact force of 2 G's will automatically lock the inertia reel and prevent the occupant from being thrown forward. To unlock the inertia reel after a 2 G force has locked it, the handle must be moved to the locked (forward) position and then to the unlocked (aft) position.

a. Removal. (1) Remove seat cushion from seat in accordance with paragraph 4-115.

(2) The remainder of the removal procedure is accomplished in accordance with paragraph 4-68.

b. Disassembly. Disassemble the inertia reel in accordance with paragraph 4-68.

c. Cleaning. Clean the inertia reel in accordance with paragraph 4-68.

d. Inspection. Inspect the inertia reel in accordance with paragraph 4-68.

e. Repair or replacement. Repair or replacement of the inertia reel and its components is accomplished in accordance with paragraph 4-68.

f. Reassembly. Reassemble the inertia reel in accordance with paragraph 4-68.

g. Installation. (1) Install the inertia reel assembly in accordance with paragraph 4-68.

(2) Install the seat cushion in accordance with paragraph 4-115.

h. Adjustment. The inertia reel should be adjusted in accordance with paragraph 4-68.

i. Maintenance operational check. The inertia reel should be checked for proper operation in accordance with paragraph 4-68.

4-120. PASSENGER SEATS. The four passenger seats mount on parallel tracks running lengthwise of the aircraft. All seats have seat belts, ash tray, fore and aft adjustment, and reclining backs.

a. Removal. (1) Lift sliding lock (1, figure 4-21) located on forward legs of seat and rotate 90 degrees in either direction.

(2) Move seat either forward or aft until seat base fittings align with circular cutouts in mounting tracks.

(3) Lift seat from mounting tracks.

b. Cleaning. Wipe off seat frames with a clean, cloth dampened with dry cleaning solvent (item 6, table 1-8) and dry with a clean, dry cloth.

c. Inspection. (1) Inspect metal parts of seats for cracks, bends, or broken weld.

(2) Inspect lock fitting for proper operation.

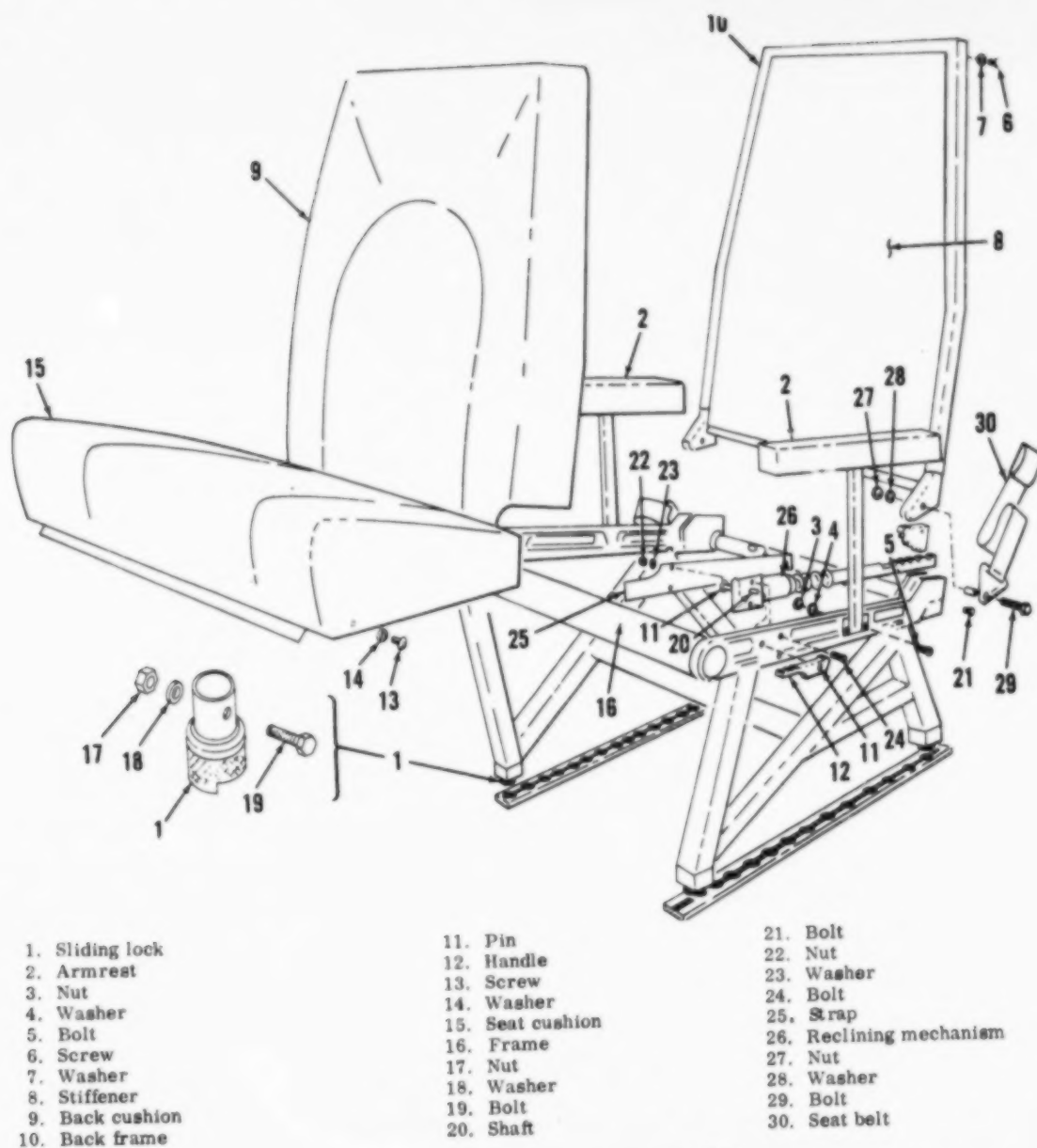


Figure 4-21. Passenger seat (U-8G)

(3) Inspect seat tracks for cracks and security of installation.

d. Installation. (1) Align base fittings with circular cutouts in mounting tracks.

(2) Lift sliding locks on forward legs and lower seat into mounting tracks.

(3) Release locks and move seat forward or aft until seat locks in position.

4-121. PASSENGER SEAT UPHOLSTERY. The passenger seats have polyurethane cushions which are covered with upholstery.

a. Removal. (1) Remove seat in accordance with paragraph 4-120.

(2) Remove armrests (2, figure 4-21) by removing nuts (3), washers (4), and bolts (5).

(3) Remove screws (6) and washers (7) securing upholstered stiffener (8) to back of seat.

(4) Pull cemented back cushion (9) from back frame (10).

NOTE

Use care to avoid tearing cushion.

(5) Remove pin (11) securing handle (12).

(6) Remove screws (13) and washers (14) securing seat cushion (15) to seat frame (16).

(7) Pull cemented seat cushion (15) from seat frame (16).

NOTE

Use care to avoid tearing cushion.

b. Cleaning. Clean seat covers in accordance with paragraph 1-159.

c. Inspection. (1) Inspect seat covers for fraying, tears, and loose stitching.

(2) Inspect cushions for wear or other visible damage.

d. Installation. (1) Apply cement (item 76, table 1-8) to both sides of back frame (10) and place back cushion (9) in position on frame.

(2) Position stiffener (8) and fasten with screws (6) and washers (7).

(3) Apply cement (item 76, table 1-8) to both sides of seat frame (16) and position seat cushion (15) on frame.

(4) Secure seat cushion (15) to frame (16) with screws (13) and washers (14).

(5) Secure handle (12) with pin (11).

(6) Secure armrests (2) with bolts (5), washers (4), and nuts (3).

(7) Install seat in accordance with paragraph 4-120.

4-122. FORE AND AFT SEAT ADJUSTMENT. Fore and aft seat adjustment is provided by fittings on the forward legs of the seat base.

a. Removal. (1) Remove seat in accordance with paragraph 4-120.

(2) Remove nuts (17, figure 4-21), washers (18), and bolts (19). Remove sliding lock (1) from legs of seat.

b. Cleaning. Clean parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect parts for cracks and wear.

d. Installation. (1) Install sliding locks (1) in forward legs of seat and secure with bolts (19), washers (18), and nuts (17).

(2) Install seat in accordance with paragraph 4-120.

4-123. SEAT RECLINE MECHANISM. The recline adjustment handle (12, figure 4-21) releases the seat reclining mechanism so that the seat back may be adjusted up or down.

a. Removal. (1) Remove passenger seat in accordance with paragraph 4-120.

(2) Remove armrests in accordance with paragraph 4-121.

(3) Remove pin (11) securing handle (12) to shaft (20).

(4) Remove seat cushion in accordance with paragraph 4-121.

(5) Remove bolts (21) securing seat back to seat. Remove seat back.

(6) Remove nut (22), washer (23), bolt (24), and strap (25) securing reclining mechanism (26) to seat frame. Remove reclining mechanism.

b. Cleaning. Clean parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect parts for broken teeth, and corrosion.

d. Installation. (1) Position reclining mechanism (26) and secure with strap (25), bolt (24), washer (23), and nut (22).

(2) Install seat back and secure with bolts (21).

(3) Install seat cushion in accordance with paragraph 4-121.

(4) Attach handle (12) to shaft (20) with pin (11).

(5) Attach armrest to seat with bolt (5) washer (4) and nut (3).

(6) Install seat in accordance with paragraph 4-120.

4-124. ARMREST. Each passenger seat is equipped with left and right upholstered armrests. An ashtray is incorporated in the inboard armrest of each seat.

a. Removal. (1) Remove armrest in accordance with paragraph 4-121.

(2) Remove upholstered pad by pulling cemented edges loose from under armrest.

b. Cleaning. (1) Clean metal parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

(2) Clean upholstery in accordance with paragraph 1-159.

c. Inspection. Inspect upholstery for tears, cuts, burns, and fraying.

d. Installation. (1) Position upholstered pad over armrest and secure edges to undersides of armrest with cement (item 76, table 1-8).

(2) Install armrest in accordance with paragraph 4-121.

4-125. SEAT BELTS. Each passenger seat is equipped with a seat belt to restrain the forward movement of the passenger from his seat in the event of bad weather, sudden deceleration, or a crash landing. The seat belt is secured to each side of the seat frame.

a. Removal. Remove nut (27), washer (28), and bolt (29) and remove seat belt (30).

b. Cleaning. Clean seat belt in accordance with TM 55-405-3.

c. Inspection. (1) Inspect belts for fraying, cuts, and broken stitches.

(2) Inspect buckles for correct operation.

(3) Inspect seat belt fittings and clamps for cracks.

d. Installation. Secure seat belt (30) to seat with bolt (29), washer (28), and nut (27).

4-126. UPHOLSTERY. (U-8G)

4-127. The aircraft interior is upholstered in high quality leather and fabric material. The sides are upholstered with two panels on each side. The front panel extends from the front seat forward and the aft panel extends to the baggage compartment. The compartment ceiling is covered with three panels extending the length of the cabin compartment. The instrument panel deck and glareshield are upholstered and padded to provide protection for the pilot and copilot.

4-128. SIDE UPHOLSTERY PANELS. Each side of the cabin compartment is upholstered with two panels.

a. Removal. (1) Remove seats in accordance with paragraphs 4-114 and 4-120.

(2) Pry clips loose from structure with a screwdriver or similar tool. Remove screws from panels.

(3) Remove panels from aircraft.

b. Cleaning. Clean upholstery panels in accordance with paragraph 1-159.

c. Inspection. (1) Inspect upholstery panels for fraying, rips, and worn spots.

(2) Inspect fasteners for condition.

d. Installation. (1) Position side panels and secure with screws and panel clips.

(2) Install seats in accordance with paragraph 4-114 and 4-120.

4-129. CEILING UPHOLSTERY PANELS. The ceiling of the cabin compartment is upholstered with three panels.

a. Removal. (1) Remove overhead light panels in accordance with paragraph 12-225.

(2) Pull center ceiling panel loose and remove from aircraft.

(3) Pull left and right ceiling panels down and remove from aircraft.

b. Cleaning. Clean upholstery panels in accordance with paragraph 1-159.

c. Inspection. Inspect upholstery panels for fraying, rips and worn spots.

d. Installation. (1) Position left and right ceiling panels and secure with clips.

(2) Position center ceiling panel and secure with clips.

(3) Install overhead light panels in accordance with paragraph 12-225.

4-130. CARPETING. (U-8G)

4-131. The cabin compartment floor is covered with a durable, tightly woven carpet. The carpet sections are secured to the floor by snap-type fasteners or cement. A curon pad is installed under each carpet section to cushion the carpet. This pad also serves to reduce floor vibration and to lengthen carpet life.

a. Removal. Remove carpeting in accordance with paragraph 4-82.

b. Cleaning. Clean carpeting in accordance with paragraph 1-159.

c. Inspection. Inspect carpeting in accordance with paragraph 4-82.

d. Installation. Install carpeting in accordance with paragraph 4-82.

4-132. FLOORBOARDS. (U-8G)

4-133. The floorboard installation (figure 4-22) consists of 3/8-inch plywood floorboard assemblies.

a. Removal. (1) Remove seats in accordance with paragraphs 4-114 and 4-120.

(2) Remove screws securing seat tracks to aircraft structure and remove seat tracks.

(3) Remove carpeting in accordance with paragraph 4-82.

(4) Remove screws and washers securing floorboard assembly to aircraft structure. Remove floorboard assembly.

b. Cleaning. Clean floorboard with soap (item 23, table 1-8). Allow floorboard to air dry.

c. Inspection. (1) Inspect floorboard assembly for cracks, separations, and excessive wear.

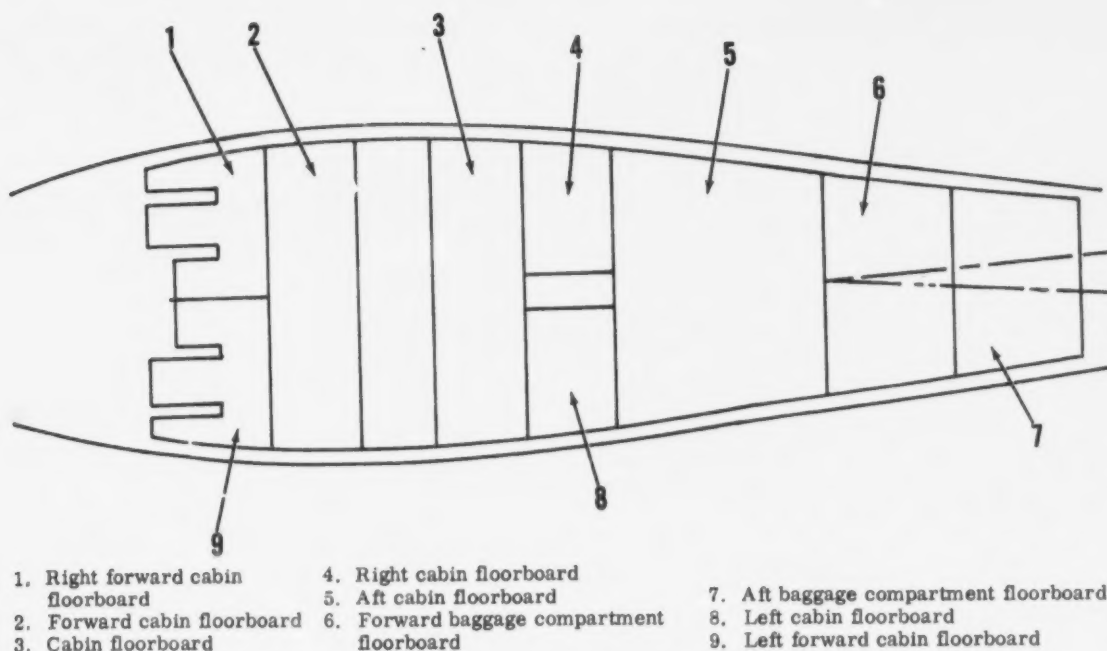


Figure 4-22. Floorboard installation (U-8G)

(2) Inspect attaching screws for damaged threads.

d. Installation. (1) Position floorboard assembly and secure with screws and washers.

(2) Install carpeting in accordance with paragraph 4-82.

(3) Secure seat tracks with screws.

(4) Install seats in accordance with paragraphs 4-114 and 4-120.

4-134. FIRST AID KITS. (U-8G)

4-135. The aircraft is equipped with two first aid kits which are secured to mounting studs with snap fasteners. One first aid kit is located on the fuselage wall forward of the baggage compartment door. The other first aid kit is located on the fuselage wall beneath the right side of the instrument panel.

4-136. BAGGAGE COMPARTMENT. (U-8G)

4-137. The baggage compartment, located in the rear of the cabin compartment, has two large shelves. The baggage compartment is upholstered and is equipped with carpeting, removable floorboards, and webbing assemblies.

4-138. BAGGAGE COMPARTMENT UPHOLSTERY. (U-8G)

4-139. The baggage compartment is upholstered with fabric panels.

a. Removal. Pry clip fasteners loose, remove screws, and remove panels.

b. Cleaning. Clean upholstery in accordance with paragraph 1-159.

c. Inspection. Inspect upholstery for fraying, tears, and broken stitching.

d. Installation. Position upholstery panels and secure with screws and clip fasteners.

4-140. BAGGAGE COMPARTMENT CARPETING. (U-8G)

4-141. The baggage compartment floor is covered with durable, tightly woven carpet.

a. Removal. Remove carpeting in accordance with paragraph 4-81.

b. Cleaning. Clean carpeting in accordance with paragraph 1-159.

c. Inspection. Inspect carpeting in accordance with paragraph 4-81.

d. Installation. Install carpeting in accordance with paragraph 4-81.

4-142. BAGGAGE COMPARTMENT FLOOR-BOARDS. (U-8G)

4-143. Refer to paragraph 4-132 for maintenance of floorboards.

4-144. WEBBING ASSEMBLIES. (U-8G)

4-145. The baggage compartment is equipped with webbing assemblies which secure the baggage.

a. Removal. Remove screws securing upper and lower webbing assembly clips and remove webbing assemblies.

b. Cleaning. Clean webbing assemblies in accordance with paragraph 1-159.

c. Inspection. (1) Inspect webbing for elasticity.

(2) Inspect clips for cracks and bends.

d. Installation. Position webbing assembly clips and secure with screws.

4-146. PILOT'S COMPARTMENT. (U-8F)

4-147. Access to the pilot's compartment is provided by sliding door panels recessed in partitions that separate the pilot's compartment and passenger compartment. The pilot's compartment is provided with a formed safety glass windshield and acrylic plastic window assemblies. Seats for a pilot and copilot are installed and are equipped with seat belts, shoulder harnesses, and inertia reels. The pilot's compartment is also equipped with upholstery, sunvisors, carpeting, floor webs, a relief tube, and a first aid kit.

4-148. PILOT'S COMPARTMENT SLIDING DOOR PANELS. (U-8F)

4-149. Sliding door panels are installed in partitions that separate the pilot's compartment and passenger compartment. The door panels slide on guide tracks attached to the floor and ceiling. Nylon rollers, fastened to the top and bottom of the panels, engage the tracks to allow the panels to slide easily. The panels are held in the open position by elastic cords hooked to the outboard edges of the door panels. Each cord is routed through a nylon pulley mounted inside the partitions and then secured at floor level. The doors are held in the closed position by a latch that can be operated from either compartment. The latching mechanism is mounted in the right-hand panel and the striker plate is in the left panel. Pull blocks are fastened

to each side of both doors. Stop screws, installed in the center of the upper guide track, prevent the doors from sliding past center.

a. Removal. (1) Remove stop screws from upper guide track.

(2) Slide each door panel inboard and unhook elastic cord.

NOTE

Hook cords over aft partition wall so cord will not retract into the partition walls.

(3) Loosen roller bracket retaining screws at top of each panel and slide rollers to their lowest position.

(4) Tilt panels aft and remove them from lower guide track.

b. Cleaning. (1) Clean rollers and guide tracks with a clean dry cloth.

(2) Clean door panels in accordance with paragraph 1-159.

c. Inspection. (1) Inspect guide tracks for cracks and bends.

(2) Inspect rollers for security and excessive wear.

(3) Inspect latch for proper operation.

d. Repair or replacement. (1) Replace worn or damaged rollers.

(2) Replace defective latching mechanism in accordance with paragraph 4-150 below.

e. Installation. (1) Position door panel in lower guide track.

(2) Adjust top rollers so door is secure in upper guide track, but will slide easily.

(3) Hook elastic cord to outboard edge of door panel.

(4) Install stop screws in upper guide track.

4-150. LATCHING MECHANISM. The latch assembly is mounted in the right hand door and may be operated from either side of the door.

a. Removal. (1) Remove pull block and latch cover from forward side of panel by removing retaining screws.

(2) Remove screws securing aft pull block to panel.

(3) Remove latch assembly and latch spring from panel through cutout in forward side of door panel.

b. Installation. (1) Hook latch spring in hole in latch assembly.

(2) Position latch assembly in panel with pivot pin down.

(3) Position aft pull block on panel and secure with short retaining screw, then install long (bottom) screw about halfway.

(4) Hook lower end of latch spring over bottom screw, then tighten screw.

(5) Position latch cover and forward pull block and install retaining screws.

4-151. WINDSHIELD. (U-8F)

4-152. The windshield consists of two sections of formed safety glass. Each section is mounted in a rubber extrusion to prevent glass-to-metal contact. In addition to the rubber extrusion, a strip of rubber material cemented to the aircraft structure provides additional cushioning and helps to seal the windshield. The windshield sections are secured to the aircraft by metal retaining strips around the edges of the windshield sections.

a. Cleaning. Clean windshield in accordance with paragraph 1-159.

b. Inspection. Inspect windshield for cracks, crazing, and discoloration.

4-153. WINDOWS. (U-8F)

4-154. Two acrylic plastic windows are installed on each side of the pilot's compartment. The hinged storm windows are formed of plastic sheet and mounted in riveted aluminum frames. The semipermanent windows aft of the storm windows are formed of plastic sheet and riveted to the aircraft structure.

4-155. STORM WINDOWS. A storm window is located on each side of the pilot's compartment aft of the windshield. The storm window consists of a sheet of acrylic plastic riveted into an aluminum frame, a continuous hinge along the top of the window, a stop assembly riveted to the airframe to hold the window open, and a latch to secure the window in the closed position.

a. Removal. (1) Release storm window latch (1, figure 4-23).

(2) Remove hinge pin (2), then remove window frame assembly (3).

b. Cleaning. Clean window plastic in accordance with paragraph 1-159.

c. Inspection. (1) Inspect windows for cracks, crazing, and discoloration.

(2) Inspect window frames and hinges for cracks and bends.

d. Installation. Position window frame assembly (3, figure 4-23), align hinge halves (4), and insert hinge pin (2).

4-156. STORM WINDOW LATCHES. Latches are provided to secure the storm windows in the closed position.

a. Removal. (1) Remove screws (5, figure 4-23) securing shim (6) and latch (1) to cabin window frame assembly (3) and remove shim and latch.

(2) Remove screw (7) securing angle (8) and remove angle.

b. Cleaning. Clean latch parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect latches for cracks and mounting holes for elongation.

d. Installation. (1) Position angle (8, figure 4-23) and secure with screw (7).

(2) Position latch (1) and shim (6) on cabin window frame assembly (3) and secure with screws (5).

4-157. STORM WINDOW SEALS. Storm window seals are cemented to the airframe around the edge of each window opening to form a watertight seal and serve as a vibration damper.

a. Removal. Remove rubber seal (9, figure 4-23) in accordance with paragraph 4-50.

b. Cleaning. Clean area where rubber seal was attached in accordance with paragraph 4-50.

c. Inspection. Inspect area where rubber seal is to be attached in accordance with paragraph 4-50.

d. Installation. Install rubber seal (9, figure 4-23) in accordance with paragraph 4-50.

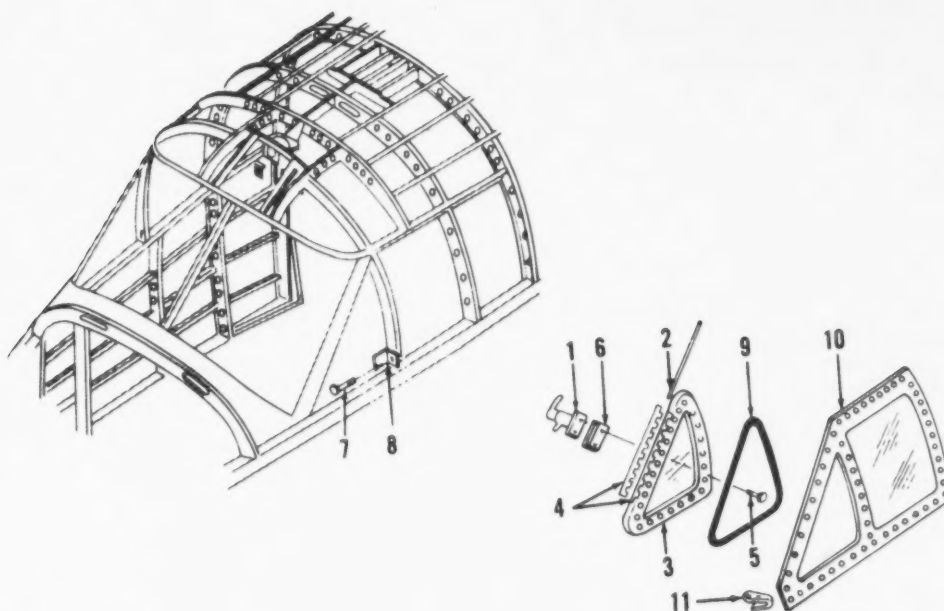
4-158. PILOT'S AND COPILOT'S SEATS. (U-8F)

4-159. The pilot's and copilot's seats are constructed of tubular steel and aluminum frames. The seats are provided with upholstery covered foam rubber cushions. An entry aisle separates the pilot's and copilot's seats. The seats can be adjusted fore and aft as well as up and down. The fore-and-aft adjustment handle is located beneath the front inboard corner of the seat cushion on each seat. Pulling up on the handle disengages the locking pins from the mounting tracks and allows the seat to move forward or aft. The height adjustment handle is located beneath the front outboard corner of the seat cushion on each seat, and is operated like the fore-and-aft adjustment handle.

a. Removal. (1) Remove stops from forward end of each mounting track.

(2) Release fore-and-aft adjustment lock.

(3) Move seat forward until it clears mounting tracks.



1. Latch
2. Hinge pin
3. Cabin window frame assembly
4. Hinge

5. Screw
6. Shim
7. Screw
8. Angle

9. Rubber seal
10. Cabin window assembly
11. Detent

Figure 4-23. Storm window installation (U-8F)

CAUTION

Lower the pilot's seat to its lowest position and place the left armrest down before removing the seat from the mounting tracks. If the seat is not lowered or if the left armrest is up, it will strike, and may damage components of the fuel selector panel.

(4) Place armrests up and turn seat on its side for removal from pilot's compartment.

b. **Cleaning.** Wipe off seat frames and seat tracks with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8), and dry with a clean dry cloth.

c. **Inspection.** (1) Inspection metal parts of seats for cracks, bends, and broken welds.

(2) Inspect locking mechanism for proper operation.

(3) Inspect seat tracks for cracks and security of installation.

(4) Every 600 hours or 12 months:

(a) Measure each crew seat foot channel to ensure compliance with the wear limit dimensions specified in Figure 4-25A or 4-25B.

NOTE

Some channels incorporate flanged plate inserts which hold the seat to the floor tracks. The only wear limit required is that the gap shown in Fig. 4-25B not exceed 0.30 inches. Replace the crew seat feet if the minimum measurements are not met.

(b) Measure the entire length of the crew chair seat tracks as shown in Figure 4-25C. Replace tracks if minimum measurements are not met.

1 The 0.108 inch dimension shown in Figure 4-25C is to be measured approximately 0.03 inch in from the edge of the flange.

2 A slight gouge in the upper surface of the track due to the crew seat lock pin is not detrimental in a forward and aft direction, provided its depth does not exceed 0.035 inch nor its width exceed 0.270 inch.

3 The lock pin holes may be elongated in a forward and aft direction up to a total diameter of 0.315 inch measured at a maximum depth of 0.06 inch (see section A-A Figure 4-25C).

(c) Replace the crew seat lock pin if the diameter measures less than 0.220 inch. Minimum pin engagement into the seat track is 0.11 inch.

d. **Installation.** (1) Position seats on floor in front of mounting tracks.

CAUTION

Lower the pilot's seat to its lowest position and place the left armrest down before removing the seat from the mounting tracks. If the seat is not lowered or if the left armrest is up, it will strike, and may damage components of the fuel selector panel.

(2) Release fore-and-aft adjustment lock and slide seat onto mounting tracks.

(3) Engage fore-and-aft adjustment lock and make certain that seat is securely in place.

(4) Install seat stops on forward ends of mounting tracks.

4-160. PILOT'S AND COPILOT'S SEAT UP-HOLSTERY. The pilot's and copilot's seats are equipped with foam rubber cushions covered with leather and fabric upholstery.

a. Removal. (1) Remove seats from aircraft in accordance with paragraph 4-159.

(2) Remove armrests by removing bolts, bearings, washers, and nuts.

(3) Remove screws (1, figure 4-24), shoulder harness hold-down strap (2), and chafing guard (3) from top of seat back.

(4) Remove screws securing upholstered pan to back of seat frame. Remove pan.

(5) Pull cemented tabs and flaps of seat back cover (4) loose from seat frame assembly.

(6) Pull cemented back cushion (5) and cap cushion (6) from seat frame sling (7).

NOTE

Be careful not to tear foam rubber back cushion.

(7) Pull cemented tabs of seat cover (8) free from seat frame assembly, and remove foam rubber seat cushion (9) through cutout in bottom of cover.

b. Cleaning. Clean seat covers in accordance with paragraph 1-159.

c. Inspection. (1) Inspect seat covers for fraying, tears, and loose stitching.

(2) Inspect foam rubber cushions for wear or visible damage.

d. Installation. (1) Apply cement (item 76, table 1-8) to rear side (firm side) of foam rubber back cushion (5, figure 4-24) and secure cushion into place on seat frame sling (7). (See view A, figure 4-24.)

NOTE

The cement should be applied to all but the bottom 6 inches of the cushion. Allow cemented surface to become tacky before pressing into position.

(2) Make cap cushion (6) from 1/2-inch thick perma comb polyether as shown in view B, figure 4-24.

(3) Apply cement to bottom and rear surfaces of cap cushion (6).

(4) Press cushion into place above seat frame so that forward edge of cushion is flush with forward surface of back cushion (5) and aft part of cushion is rolled around seat frame. (See view B, figure 4-24.)

(5) Cut rear cushion (10) from 1-inch thick piece of perma comb polyether as shown in view C, figure 4-24.

(6) Spread cement (item 76, table 1-8) on inside surface and edges of rear cushion and press cushion into place on seat frame sling (7).

(7) Sprinkle talc (item 54, table 1-8) on cushions (5, 6, and 10) and inside back cover (4) so cover will slide over cushions easily.

(8) Place cover over seat back and, while pulling cover down over cushions, work out wrinkles and straighten seams.

NOTE

If a new cover is being installed, cutouts will need to be made in the side tabs of the cover to clear inertia reel mounting rail. Also, the inside seams of cover should be trimmed to within 1/8-inch of the stitch to prevent bulging after cover is installed.

(9) Brush a light coat of cement (item 76, table 1-8) across inside surface of lower cover flap.

(10) Pulling cover taut, work flap under bottom edge of seat back cushion and press cemented surface against seat frame sling. (See view A, figure 4-24.)

(11) Apply cement (item 76, table 1-8) to back of cover side tabs.

(12) With cover stretched firmly across cushion, wrap side tabs around seat frame tube and press them into place.

(13) Coat inside surface of rear flap with cement (item 76, table 1-8).

(14) Press cemented surface onto seat frame sling and smooth out wrinkles.

(15) Insert seat cushion (9) through cutout in seat cover (8), positioning firm side of cushion down. Carefully smooth out all wrinkles and straighten seams.

(16) Apply a thin coat of cement (item 76, table 1-8) under each cover tab.

(17) Position cushion and cover assembly on seat frame sling (7) and wrap tabs tightly around seat frame tube.

(18) Install armrests at lower armrest hole in seat frame and secure with bolts, bearings, washers, and nuts. Armrests equipped with ashtrays fit on inboard side of seat with respect to centerline of aircraft.

(19) Secure shoulder harness chafing guard (3) and hold down strap (2) to top of seat back with screws. Upholstery will need to be perforated with a scribe or similar tool to accommodate screws.

(20) Attach pan to back of seat frame with screws.

(21) Install seat in accordance with paragraph 4-159.

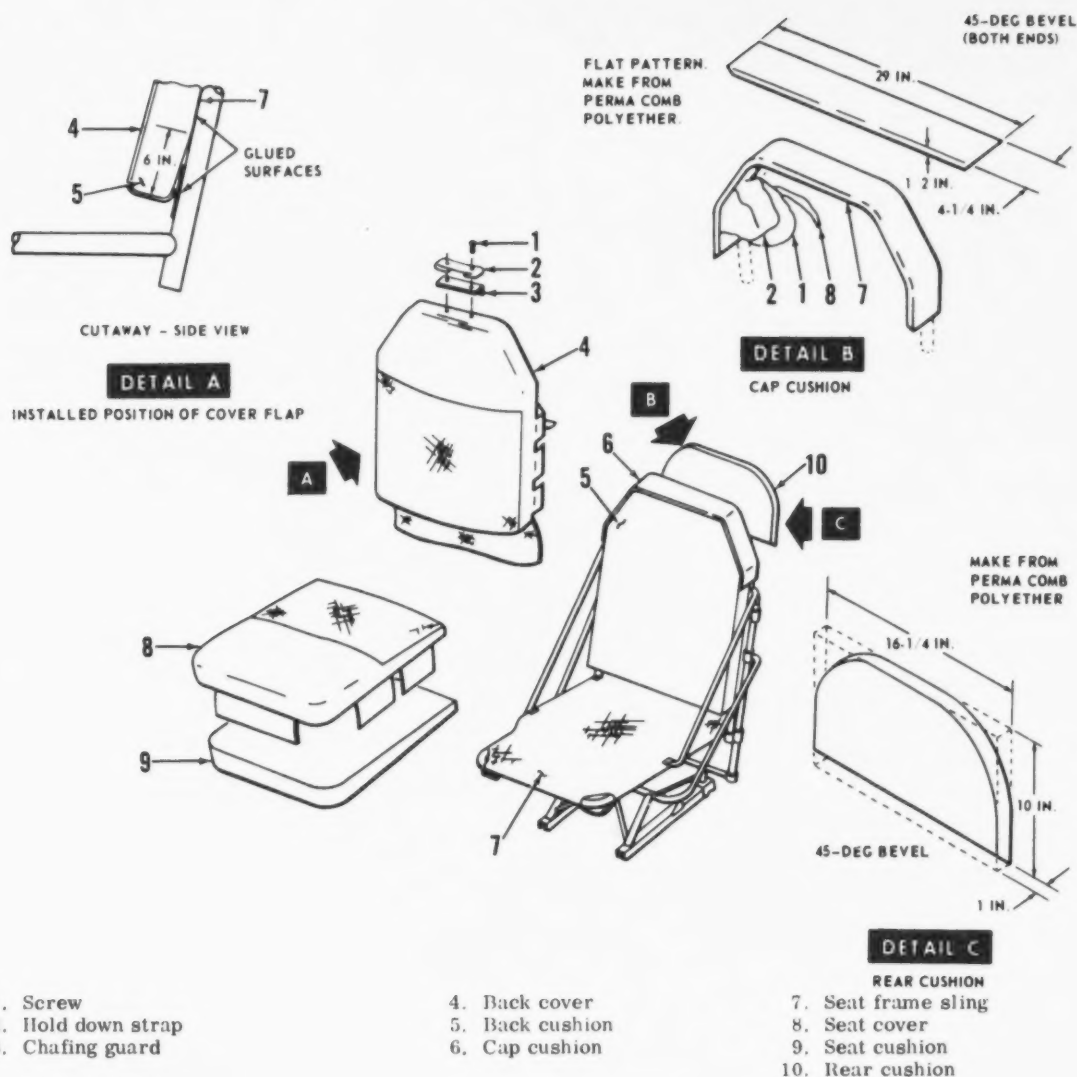


Figure 4-24. Pilot's and copilot's seat upholstery (U-8F)

4-161. FORE-AND-AFT SEAT ADJUSTMENT MECHANISM. The fore-and-aft seat adjustment mechanism is attached to the bottom of the seat frame and is actuated by a handle located under the forward edge of the seat. Pulling up on the handle disengages the locking pins from the mounting tracks and allows the seat to move forward or aft.

a. Removal. (1) Remove pilot's and copilot's seats from aircraft in accordance with paragraph 4-159.

(2) Remove pan from seat back frame by removing screws.

(3) Disconnect one end of link assembly (1, figure 4-25) from bellcrank (2) by removing pin and cotter pin (3). Disconnect other end from bellcrank (4) by removing pin (5) and cotter pin (6).

(4) Remove screw (7), spacer (8), washer (9), nut (10), and spring (11) from axle (12).

(5) Remove handle (13) by removing spring pin (14).

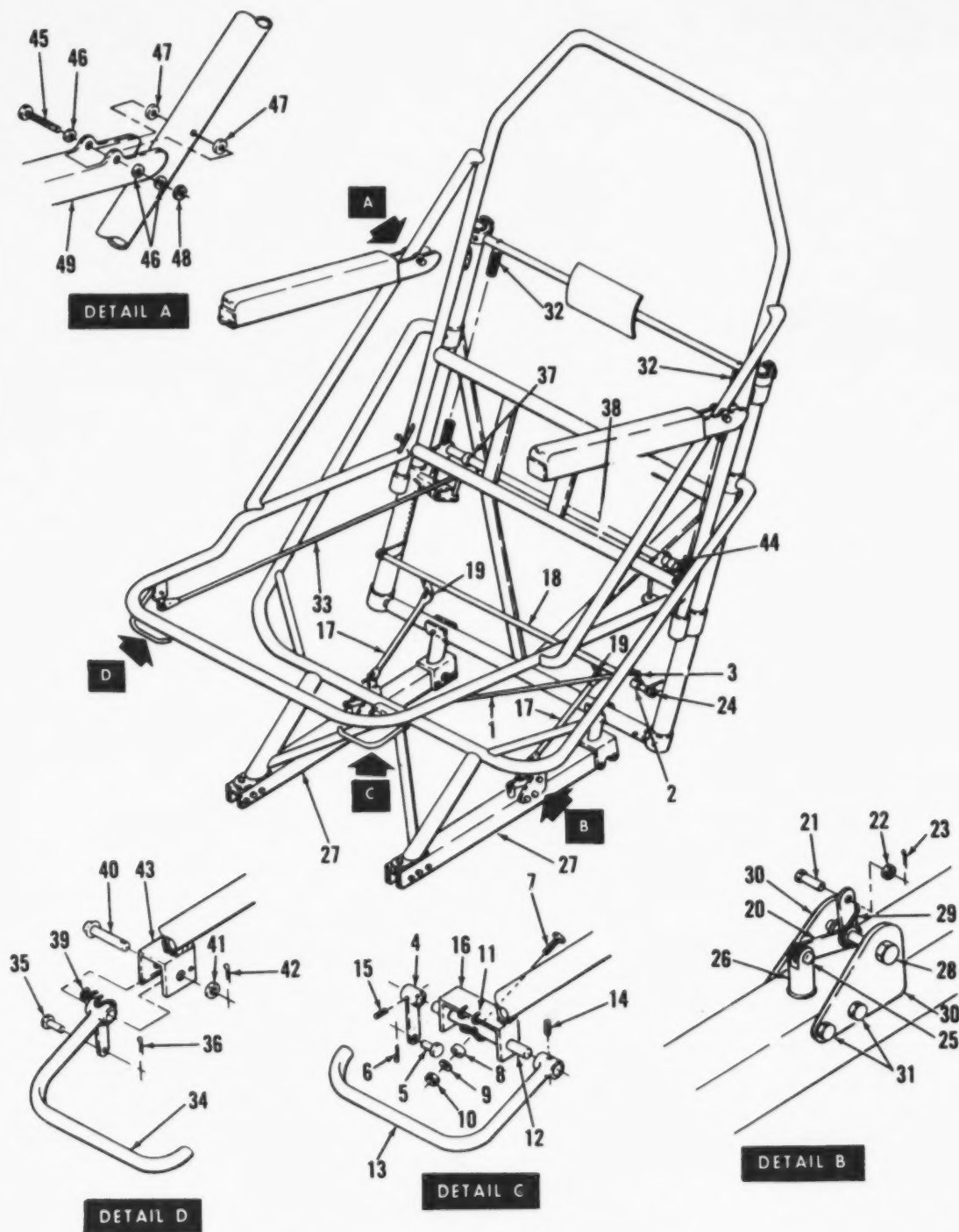


Figure 4-25. Pilot's and copilot's seat locking mechanism (U-8F) (sheet 1 of 2)

1. Link assembly	18. Shaft	34. Pin
2. Bellcrank	19. Pin, washer, cotter pin	36. Cotter pin
3. Cotter pin	20. Bellcrank	37. Bellcrank
4. Bellcrank	21. Pin	38. Shaft
5. Pin	22. Washer	39. Spring
6. Cotter pin	23. Cotter pin	40. Pin
7. Screw	24. Collar, spring pin	41. Washer
8. Spacer	25. Pin, washer, cotter pin	42. Cotter pin
9. Washer	26. Lock pin	43. Bracket
10. Nut	27. Base channel	44. Collar, spring pin
11. Spring	28. Bolt, washer, nut	45. Bolt
12. Axle	29. Spring	46. Washer
13. Handle	30. Side plate	47. Bearing
14. Spring pin	31. Bolt, washer, nut	48. Nut
15. Spring pin	32. Spring	49. Armrest
16. Bracket	33. Link assembly	
17. Link assembly	34. Handle	

Figure 4-25. Pilot's and copilot's seat locking mechanism (U-8F) (sheet 2 of 2)

(6) Remove bellcrank (4) from axle (12) by removing spring pin (15). Remove axle from bracket (16).

(7) Disconnect link assemblies (17) from shaft (18) by removing pins, washers, and cotter pins (19). Disconnect other ends from bellcranks (20) by removing pins (21), washers (22), and cotter pins (23).

(8) Remove shaft (18) from seat frame by removing collars and spring pins (24). Remove spring pin securing bellcrank (2) to shaft and remove bellcrank.

(9) Remove pin, washer, and cotter pin (25) from lock pin (26). Remove lock pin from base channel (27).

(10) Remove bolt, washer, and nut (28), spring (29), and bellcrank (20) from side plates (30) on base channel (27).

(11) Remove bolts, washers, and nuts (31) from side plates (30). Remove side plates.

b. Cleaning. Clean parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. (1) Inspect parts for cracks, bends, and malformed threads.

(2) Inspect springs for adequate tension.

d. Installation. (1) Position side plates (30, figure 4-25) against base channel (27) and secure with bolts, washers, and nuts (31).

(2) Insert bolt (28) through hole in outboard side plate (30) and assemble spring (29) and bellcrank (20) on bolt shank. Push bolt through inboard side plates and secure with washer and nut.

(3) Position lock pin (26) in hole in base channel (27) and attach bellcrank (20) to lock pin with pin, washer, and cotter pin (25).

(4) Attach bellcrank (2) to shaft (18) with spring pin, and position shaft (18) in brackets on

seat back frame and secure with collars and spring pins (24).

(5) Attach ends of link assemblies (17) to bellcranks (20) with pins (21), washers (22), and cotter pins (23). Attach other ends of link assemblies to shaft (18) with pins, washers, and cotter pins (19).

(6) Attach bellcrank (4) to axle (12) with spring pin (15). Insert axle into bracket (16) as shown.

(7) Attach handle (13) to axle (12) with spring pin (14).

(8) Attach spring (11) to bracket (16) and axle (12) with screw (7), spacer (8), washer (9), and nut (10).

(9) Attach one end of link assembly (1) to bellcrank (2) with pin and cotter pin (3). Attach other end to bellcrank (4) with pin (5) and cotter pin (6).

(10) Position pan on seat back frame and secure with screws.

(11) Install pilot's and copilot's seats in accordance with paragraph 4-159.

4-162. VERTICAL SEAT ADJUSTMENT MECHANISM. A vertical adjustment mechanism, located under the seat, allows the spring-loaded seat to be raised or lowered by pulling up on the adjustment handle.

a. Removal. (1) Remove pilot's and copilot's seats from aircraft in accordance with paragraph 4-159.

(2) Remove seat bottom and seat upholstery, if required, in accordance with paragraph 4-160.

(3) Unhook springs (32, figure 4-25) from seat back frame and brackets.

(4) Disconnect one end of link assembly (33) from handle (34) by removing pin (35) and cotter pin (36). Disconnect other end from bellcrank (37) attached to shaft (38), by removing pin and

cotter pin.

(5) Remove handle (34) and spring (39) by removing pin (40), washer (41), and cotter pin (42) from bracket (43).

(6) Remove shaft (38) from seat back frame by removing collars and spring pins (44). Remove bellcrank (37) from shaft by removing spring pin.

b. Cleaning. Clean parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. (1) Inspect parts for cracks and bends.

(2) Inspect springs for adequate tension.

d. Installation. (1) Attach bellcrank (37, figure 4-25) to shaft (38) with spring pin, and position shaft in brackets attached to seat back frame. Secure with collars and spring pins (44).

(2) Position handle (34) and spring (39) in bracket (43) mounted to front of seat frame and secure with pin (40), washer (41), and cotter pin (42).

(3) Attach one end of link assembly (33) to handle (34) with pin (35) and cotter pin (36). Attach other end to bellcrank (37), attached to shaft (38), with pin and cotter pin.

(4) Hook springs (32) to seat back frame and brackets.

(5) Install seat bottom and seat upholstery, if removed, in accordance with paragraph 4-160.

(6) Install pilot's and copilot's seats in accordance with paragraph 4-159.

4-163. ARMRESTS. The pilot's and copilot's seats are equipped with upholstered armrests on each side of the seat. The armrests may be raised by lifting them up. An ash tray is provided in the forward end of one armrest on each seat.

a. Removal. (1) Remove bolt (45, figure 4-25), washers (46), bearings (47), and nut (48). Remove armrest (49).

(2) Remove upholstered cover by pulling cemented edges loose from under armrests.

b. Cleaning. (1) Clean parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

(2) Clean upholstered cover in accordance with paragraph 1-159.

c. Inspection. (1) Inspect upholstered cover for tears, cuts, worn areas, and broken stitches.

(2) Inspect armrest for cracks and elongated mounting holes.

d. Installation. (1) Position upholstered cover over armrest and secure edges to undersides of armrest with cement (item 76, table 1-8).

(2) Position armrest (49, figure 4-25) on seat frame and secure with bolt (45), washers (46), bearings (47), and nut (48).

4-164. PILOT'S AND COPILOT'S SEAT BELTS. The pilot's and copilot's seats are equipped with seat belts to restrain the forward movement of the occupant from his seat in the event of bad weather, sudden deceleration, or a crash landing. The seat belts are secured to each side of the seat frame.

a. Removal. Remove screw, washer, and nut securing each half of seat belt to clamp on seat frame. Remove belt.

b. Cleaning. Clean seat belts in accordance with TM 55-1500-204-25/1.

c. Inspection. (1) Inspect webbing of seat belts for fraying, cuts, and broken stitching.

(2) Inspect buckle for proper operation.

(3) Inspect seat belt fittings and clamps for cracks.

d. Installation. (1) Position seat belt across seat and insert seat belt fittings inside clamps.

(2) Secure fittings with crews, washers, and nuts.

4-165. PILOT'S AND COPILOT'S SHOULDER HARNESS. The pilot's and copilot's seats are equipped with shoulder harnesses to restrain the forward movement of the occupant. These shoulder harnesses incorporate automatic inertia reels to allow the added movement needed to operate the controls. The inertia reel assembly is attached to the back of the seat and is controlled by a two-position lever in a control quadrant located on the forward edge of the seat, to the left of the occupant.

a. Removal. (1) Remove pilot's or copilot's seat from aircraft in accordance with paragraph 4-159.

(2) Remove screws securing pan to seat frame. Remove pan.

(3) Remove bolt, washer, and nut securing shoulder harness to inertia reel cable clevis.

(4) Remove screws (1, figure 4-24) from top of seat back securing hold-down strap (2) and chafing guard (3). Remove shoulder harness.

b. Cleaning. Clean shoulder harness in accordance with TM 55-1500-204-25/1.

c. Inspection. (1) Inspect webbing of shoulder harness for fraying, cuts, and broken stitching.

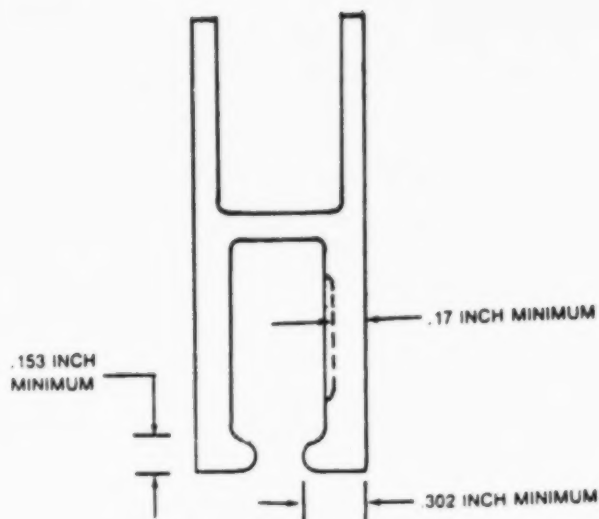
(2) Inspect adjustment buckle and guard plate for cracks and burrs that could snag webbing.

d. Installation. (1) Position shoulder harness over back of seat and secure in hold down strap (2, figure 4-24) and chafing guard (3) with screws (1).

(2) Attach shoulder harness to inertia reel cable clevis with bolt, washer, and nut.

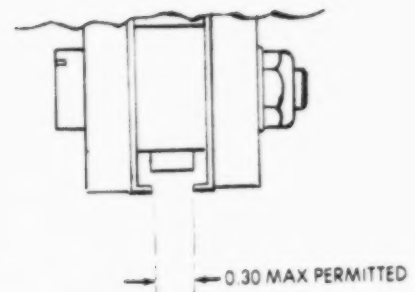
(3) Attach pan to seat frame with screws.

(4) Install pilot's or copilot's seat in accordance with paragraph 4-159.

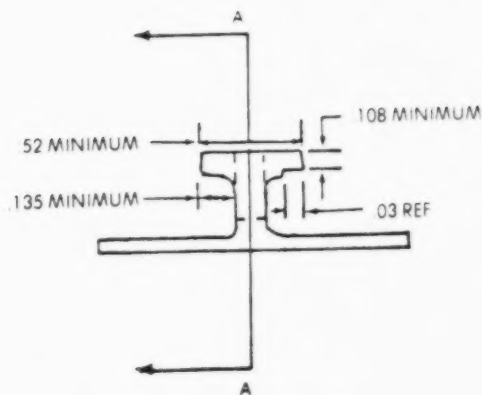


MEASUREMENTS GIVEN ARE TYPICAL FOR
BOTH SIDES OF THE SEAT FOOT CHANNEL
ALL MEASUREMENTS ARE GIVEN IN INCHES

Crew Chair Seat Foot Channel
Figure 4-25 A

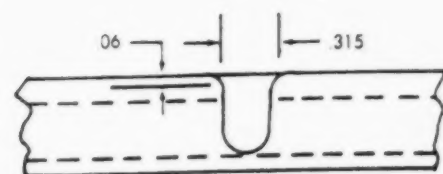


Crew Chair Seat Foot Channel
(Alternate Configuration)
Figure 4-25 B



ALL MEASUREMENTS
ARE GIVEN IN INCHES

Crew Seat Track
Figure 4-25 C



SECTION A-A

MEASUREMENTS GIVEN ARE TYPICAL FOR
ENTIRE LENGTH OF CREW SEAT TRACKS

4-166. INERTIA REEL ASSEMBLY. The inertia reel assembly is attached to the seat back structure on the pilot's and copilot's seats and is controlled by a two-position lever in a control quadrant located on the left forward edge of each seat. A flexible cable and housing assembly links each control handle to its respective inertia reel. A spring-loaded latch in the end of the handle locks the handle in either selected position. When the handle is unlocked (aft), the inertia reel maintains a slight tension on the harness but permits the pilot or copilot to lean forward to reach the controls. When the handle is moved to the locked (forward) position, the inertia reel locks the harness in successive positions as the pilot leans back. Before the inertia reel can be unlocked, all tension must be removed from the harness by leaning full back in the seat. If the handle is in the unlocked (aft) position, an impact force of 2 G's will automatically lock the inertia reel and prevent the occupant from being thrown forward. To unlock the inertia reel after a 2 G force has locked it, the handle must be moved to the locked (forward) position and then to the unlocked (aft) position.

a. Removal. (1) Remove pilot's or copilot's seat from aircraft in accordance with paragraph 4-159.

(2) Remove screws securing pan to seat frame. Remove pan.

(3) Remove bolt, washer, and nut securing shoulder harness to inertia reel cable clevis.

(4) Remove control cable stop at control quadrant with a pair of pliers or similar tool, being careful not to damage end of control cable.

(5) Loosen clamp from cable housing at control quadrant.

(6) Loosen clamps on side of seat and withdraw control cable assembly.

(7) Remove mounting bolts from inertia reel assembly and remove inertia reel assembly.

NOTE

If a new inertia reel assembly is to be installed, the length of the old cable housing should be determined and a new cable housing cut to the proper length.

b. Disassembly. Disassemble inertia reel assembly in accordance with paragraph 4-68.

c. Cleaning. Clean inertia reel assembly in accordance with paragraph 4-68.

d. Inspection. Inspect inertia reel assembly in accordance with paragraph 4-68.

e. Repair or replacement. Repair or replace inertia reel assembly parts in accordance with paragraph 4-68.

f. Reassembly. Reassemble inertia reel assembly in accordance with paragraph 4-68.

g. Installation. (1) Accomplish maintenance operational check, before installing inertia reel assembly on seat, in accordance with paragraph 4-68.

(2) Position inertia reel assembly on back of seat, align mounting holes, with reel cable pointed toward top of seat. Secure inertia reel assembly to seat with bolts.

(3) Route control cable housing through housing clamps on side of seat structure and through clamp at control quadrant.

(4) Install a new cable stop on control cable and crimp it securely on cable with a swaging tool.

(5) Secure shoulder harness to inertia reel cable clevis with bolt, washer, and nut.

(6) Secure pan to seat frame with screws.

(7) Install pilot's or copilot's seat in accordance with paragraph 4-159.

h. Adjustment. Adjust inertia reel assembly in accordance with paragraph 4-68.

i. Maintenance operational check. Perform maintenance operational check on inertia reel assembly in accordance with paragraph 4-68.

4-167. UPHOLSTERY. (U-8F)

4-168. The aircraft is upholstered in high quality leather and fabric material. Leather scuff strips are incorporated into the upholstery panels at high wear areas.

4-169. CEILING PANELS. The flight compartment has three upholstered ceiling panels.

a. Removal. (1) Remove screws and retaining rings securing cold air outlets. Remove outlets.

(2) Remove overhead light panel in accordance with paragraph 12-225.

(3) Remove screws securing window moldings and remove moldings.

(4) Remove screws securing forward edge of front panel to aircraft.

(5) Remove screws securing two short retaining strips and one long retaining strip to aircraft.

(6) Remove forward panels from aircraft.

(7) Pull cemented sections of aft upholstery panel loose from aircraft.

(8) Pry clip fasteners loose and remove panel from aircraft.

b. Cleaning. (1) Clean upholstery panels in accordance with paragraph 1-159.

(2) Blow out cold air outlets with compressed air.

c. Inspection. (1) Inspect upholstery panels for fraying, rips, cuts, and worn areas.

- (2) Inspect stitching for broken threads.
- (3) Inspect clip fasteners for security of attachment.
- (4) Inspect cold air outlets.
- d. Installation. (1) Place long, aft panel in position and secure with clip fasteners.
- (2) Cement ends and forward edge of upholstery fabric to aircraft with cement (item 76, table 1-8).
- (3) Place center panel in position and install long retaining strips. Secure with screws.
- (4) Place forward panel in position and install short retaining strips. Secure with screws.
- (5) Place window moldings in position and secure with screws.
- (6) Install overhead light panel in accordance with paragraph 12-225.
- (7) Secure cold air outlets with screws and retaining rings.

4-170. SIDE PANELS. The pilot's compartment has one upholstered panel on each side.

- a. Removal. (1) Remove pilot's and copilot's seats from aircraft in accordance with paragraph 4-159.
- (2) Remove screws securing window moldings and remove moldings.
- (3) Remove fuel control panel cover and deicer gage cover by removing retaining screws.
- (4) With a large screwdriver or similar blunt tool, pry retaining strip covers from retaining strips.
- (5) Remove screws that secure retaining strip to aircraft fuselage formers.

NOTE

The screws securing retaining strips to the aircraft are the larger, irregularly spaced screws.

- (6) Pry clip fasteners loose and remove panels.
- b. Cleaning. Clean upholstery panels in accordance with paragraph 1-159.
- c. Inspection. (1) Inspect upholstery panels for fraying, rips, cuts, and worn areas.
- (2) Inspect stitching for broken threads.
- (3) Inspect clip fasteners for security of attachment.
- d. Installation. (1) Place side panels in position and secure clip fasteners.
- (2) Install screws that secure panel retaining strip to aircraft.
- (3) Snap retaining strip covers in place on retaining strips.
- (4) Place fuel control panel cover and deicer gage cover in place and install retaining screws.

- (5) Place window moldings in position and secure with screws.

- (6) Install pilot's and copilot's seats in accordance with paragraph 4-159.

4-171. INSTRUMENT PANEL GLARE SHIELD. An upholstered glare shield located over the instrument panel is attached to the instrument panel deck.

- a. Removal. Remove screws securing glare shield to instrument panel deck. Remove glare shield.
- b. Cleaning. Clean upholstered glare shield in accordance with paragraph 1-159.
- c. Inspection. Inspect glare shield for bends, cuts, tears, and fraying.
- d. Installation. Position glare shield above instrument panel and secure to instrument panel deck with screws.

4-172. SUNVISORS. (U-8F)

4-173. The aircraft is equipped with two sunvisors. One is located near the upper outside corner of each windshield section. The sunvisor will rotate horizontally on its mounting bracket from the windshield to the side window. It also rotates vertically to stow out of the way against the head liner. It will slide out on its shaft to extend beyond the center of the windshield.

- a. Removal. Remove sunvisors in accordance with paragraph 4-80.
- b. Cleaning. Clean sunvisors in accordance with paragraph 1-159.
- c. Inspection. Inspect sunvisors in accordance with paragraph 4-80.
- d. Installation. Install sunvisors in accordance with paragraph 4-80.

4-174. CARPETING. (U-8F)

4-175. The aircraft is carpeted with a durable, tightly woven carpet. The carpet sections are secured to the floor by snap-type fasteners or cement. A curon pad is installed under each carpet section to cushion the carpet. This pad also serves to reduce floor vibration and to lengthen carpet life.

- a. Removal. Remove carpeting in accordance with paragraph 4-81.
- b. Cleaning. Clean carpeting in accordance with paragraph 1-159.
- c. Inspection. Inspect carpeting in accordance with paragraph 4-81.
- d. Installation. Install carpeting in accordance with paragraph 4-81.

4-176. FLOOR WEBS.(U-8F)

4-177. There are five aluminum floor webs and web assemblies in the flight compartment. (See figure 4-26.)

a. Removal. (1) Remove pilot's and copilot's seats if floor web assemblies (2 and 8, figure 4-26) are to be removed. Refer to paragraph 4-159 for seat removal.

(2) Remove screws securing seat tracks to floor web assemblies (2 and 8).

(3) Remove carpeting in accordance with paragraph 4-81.

(4) Remove screws securing floor webs (1 and 10) and web assemblies (2, 8, and 9) to airframe structure. Remove floor webs and web assemblies.

b. Cleaning. Clean floor webs and web assemblies with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect floor webs and web assemblies for cracks and bends.

d. Installation. (1) Position floor webs (1 and 10, figure 4-26) and web assemblies (2, 8, and 9) on flight compartment airframe structure and secure with screws.

(2) Install carpeting in accordance with paragraph 4-81.

(3) Secure seat tracks to floor web assemblies (2 and 8) with screws.

(4) Install pilot's and copilot's seats in accordance with paragraph 4-159.

4-178. RELIEF TUBE.(U-8F)

4-179. A relief tube (4, figure 4-27) is secured to the frame of the pilot's seat with a bracket. The tube is routed through grommets in the flight compartment floor web assembly and the fuselage skin to a venturi mounted on the underside of the fuselage.

a. Removal. (1) Remove tape and wire from ends of relief tube (4, figure 4-27). Detach relief tube from relief tube horn (8).

(2) Remove pilot's seat in accordance with paragraph 4-159.

(3) Remove seat tracks by removing screws.

(4) Remove carpeting in accordance with paragraph 4-81.

(5) Remove floor web assembly (8, figure 4-26) by removing screws.

(6) Remove relief tube (4, figure 4-27) from venturi (5).

(7) Remove clamps securing relief tube and remove relief tube from aircraft.

(8) Remove screws (6) and remove venturi (5) from fuselage skin.

(9) Remove screw (3) and remove bracket (2) from frame of pilot's seat.

b. Cleaning. Clean relief tube in accordance with paragraph 1-163.

c. Inspection. (1) Inspect horn and venturi for cracks.

(2) Inspect tube for deterioration.

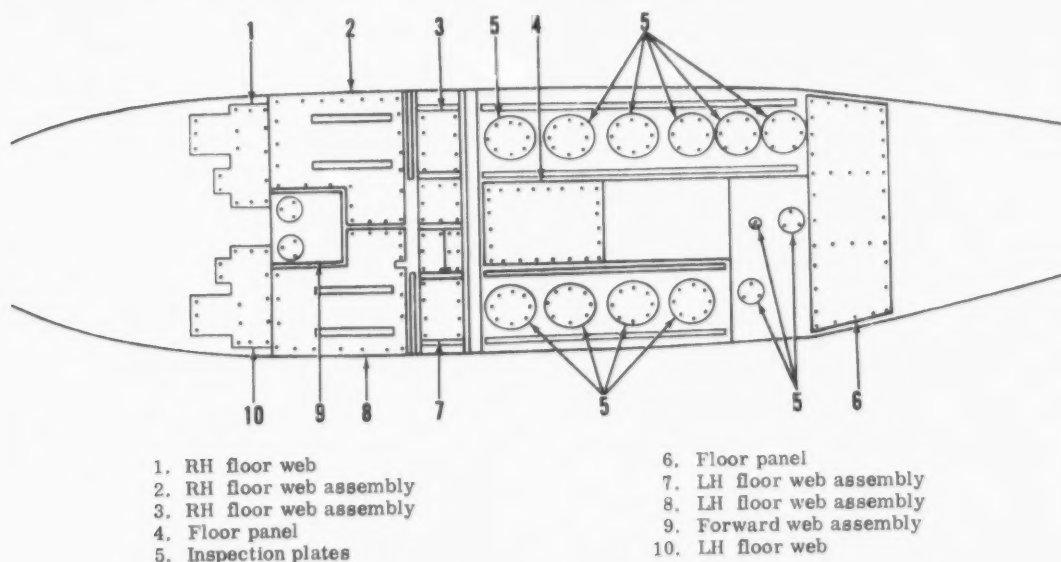


Figure 4-26. Floor web and panel installation (U-8F)

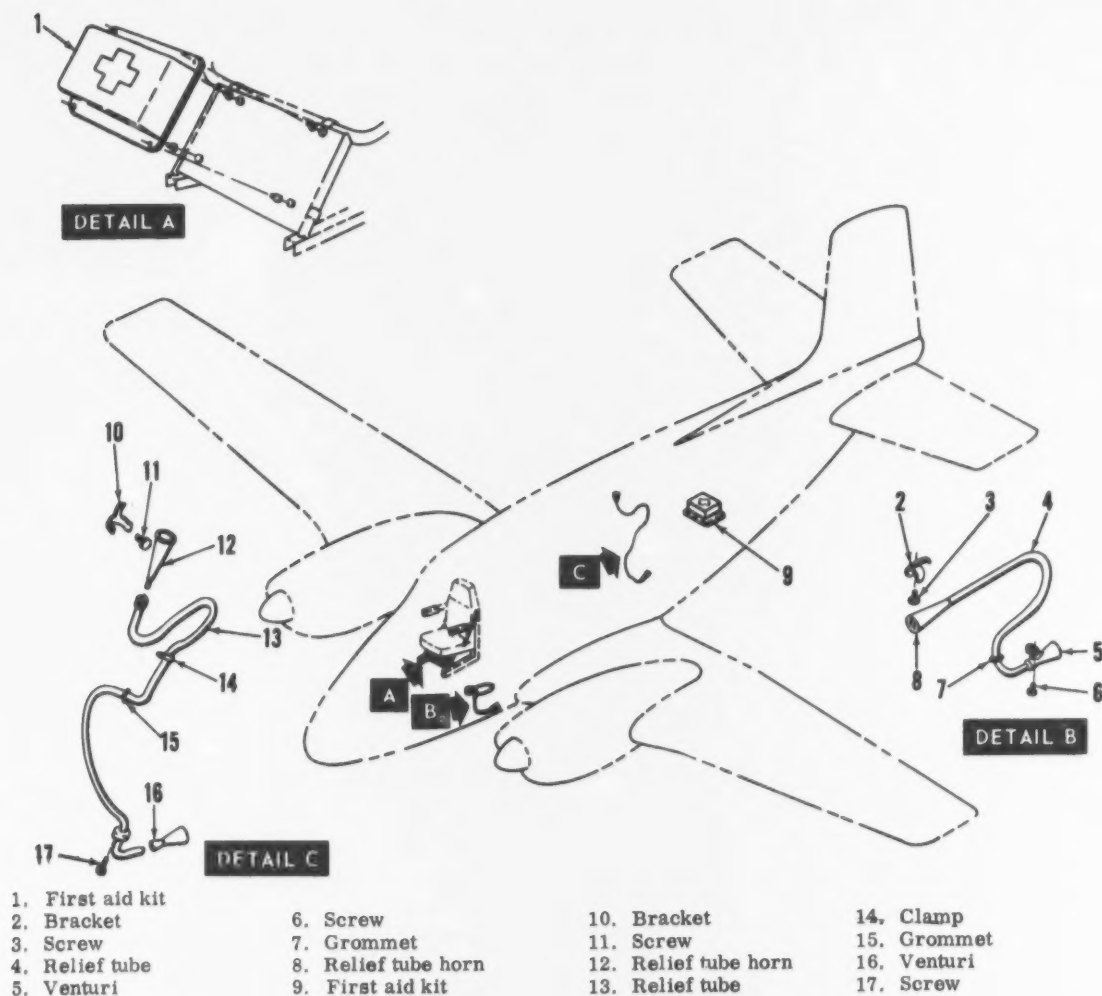


Figure 4-27. Relief tubes and first aid kit installation (U-8F)

d. Installation. (1) Route relief tube (4, figure 4-27) through grommet (7) in fuselage skin and secure with clamps.

(2) Attach venturi (5) to fuselage skin with screws (6).

(3) Attach bracket (2) to frame of pilot's seat with screw (3).

(4) Route relief tube (4) through floor web assembly (8, figure 4-26) and secure floor web assembly to airframe structure with screws.

(5) Attach relief tube (4, figure 4-27) to relief tube horn (8) with lock wire and insulation tape (item 53, table 1-8).

(6) Attach relief tube (4) to venturi (5) with

lock wire and insulation tape (item 53, table 1-8).

(7) Install carpeting in accordance with paragraph 4-81.

(8) Position seat tracks on floor web assembly (8, figure 4-26) and secure with screws.

(9) Install pilot's seat in accordance with paragraph 4-165.

4-180. FIRST AID KIT.(U-8F)

4-181. A first aid kit is attached by four snap fasteners to a plate, located under the copilot's seat. (See figure 4-27.)

4-182. PASSENGER COMPARTMENT. (U-8F)

4-183. The passenger compartment is entered through a door on the left side of the fuselage. Semipermanent windows are installed on each side of the compartment. The right rear window is incorporated in the emergency escape hatch. Seats for four passengers are installed in the compartment and are equipped with seat belts. The passenger compartment is also furnished with ceiling and side upholstery panels, curtains, carpeting, floor webs, a relief tube, and a first aid kit.

4-184. PASSENGER COMPARTMENT DOOR. (U-8F)

4-185. The passenger compartment door is located on the left side of the fuselage aft of the wing trailing edge. Stair steps are incorporated into the door design to provide quick and easy access to the aircraft interior. A plastic covered cable, located on the aft edge of the door, provides an assist rail for entry and exit as well as supporting the door in the open position. The door may be opened from either side by the latch handles. A key-operated locking mechanism is incorporated in the exterior latch handle. The door is hinged at the bottom by a continuous piano-type hinge along the width of the door. A rubber seal is installed over the hinge and around the door to prevent cold air and water from entering the passenger compartment.

a. Cleaning. Clean passenger compartment door in accordance with paragraph 1-159.

b. Inspection. (1) Inspect door hinge for cracks and condition of rivets.

(2) Inspect latching mechanism for proper operation.

(3) Inspect cable and plastic cover for damage.

4-186. WINDOWS. (U-8F)

4-187. The windows in the passenger compartment are semipermanently installed and do not open. All side window assemblies, except the right rear window, consist of a sheet of transparent plastic permanently in-framed and riveted to the fuselage. The right rear compartment window consists of a sheet of transparent plastic mounted in a frame in the emergency escape hatch.

a. Cleaning. Clean window plastic in accordance with paragraph 1-159.

b. Inspect. Inspect windows for cracks, crazing, and discoloration.

4-188. EMERGENCY ESCAPE HATCH. (U-8F)

4-189. The emergency escape hatch is located on the aft right hand side of the passenger compartment. The window is incorporated into the escape hatch. A quick release mechanism allows the hatch to be jettisoned for emergency exit from the aircraft.

a. Removal. (1) Unsnap curtains from top and bottom of right rear window.

(2) Remove roll curtain in accordance with paragraph 4-203.

(3) Pull down red safety panel over release arm.

(4) Push red release button to free release arm from stop.

CAUTION

Position a man outside of aircraft to hold hatch, and prevent it from falling.

(5) Remove rubber seal (9, figure 4-28) in accordance with paragraph 4-50.

b. Disassembly. (1) Remove upholstery panel, red safety panel, and release handle escutcheon from escape hatch by removing screws that secure them.

(2) Remove screws (3, figure 4-28) securing metal cover (5) to escape hatch (1).

(3) Remove screws and washers (11), screws (12), spacers (8), and nuts (7) that secure springs (10) at each end of release tube (6).

(4) Remove screws, washers, and nuts (4), from each end of release tube (6). Remove lock assembly (2) from each end of release tube (6).

(5) Lift release tube (6) out of escape hatch (1), and slide springs (10) from release tube.

(6) Remove screws, washers, and nuts (13) securing arm (14) to braze assembly on release tube (6). Remove arm.

(7) Remove trigger (15) from arm (14) by removing bolt (18). Remove spring (20) and spacer (19).

(8) Remove release button (17) from trigger (15) by removing screws (16).

c. Cleaning. (1) Clean metal parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

(2) Clean upholstery panel in accordance with paragraph 1-159.

(3) Clean area where rubber seal was attached in accordance with paragraph 4-50.

d. Inspection. (1) Inspect metal parts for cracks, bends, and stripped threads.

(2) Inspect upholstery panel for fraying, cuts, tears, and broken stitches.

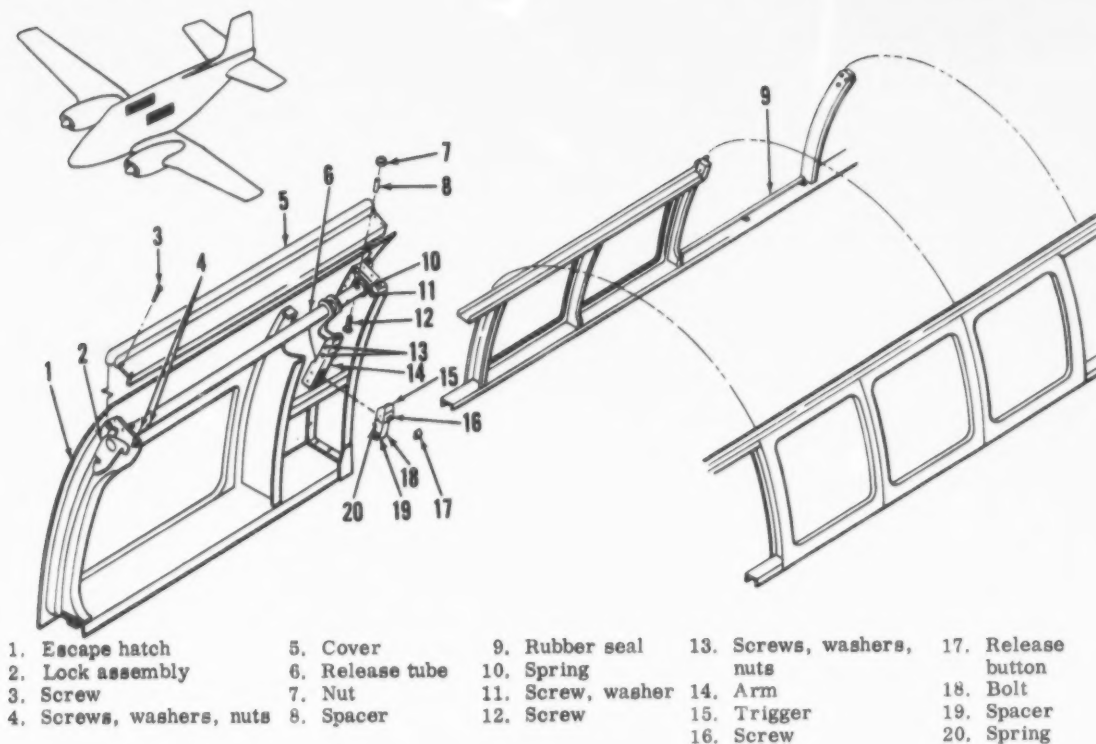


Figure 4-28. Emergency escape hatch (U-8F)

(3) Inspect area where rubber seal is to be attached in accordance with paragraph 4-50.

e. Repair or replacement. Replace defective parts.

f. Reassembly. (1) Secure release button (17, figure 4-28) to trigger (15) with screws (16).

(2) Secure trigger (15), spring (20), and spacer (19) to arm (14) with bolt (18).

(3) Secure arm (14) to braze assembly on release tube (6) with screws, washers, and nuts (13).

(4) Position springs (10) over each end of release tube (6), and place release tube in escape hatch (1).

(5) Position lock assembly (2) in each end of release tube (6) and secure with screws, washers, and nuts (4) at each end of release tube.

(6) Secure springs (10) to each end of release tube (6) with screws and washers (11), screws (12), spacers (8), and nuts (7).

(7) Position metal cover (5) on escape hatch (1) and secure at each end with screws (3).

(8) Install release handle escutcheon, red safety panel, and upholstery panel and secure with screws.

g. Installation. (1) Install rubber seal (9, figure

4-28), in accordance with paragraph 4-50 in cabin structure opening.

(2) Position escape hatch (1) in cabin structure opening.

(3) Push release arm down and engage release button.

(4) Pull red safety panel up.

(5) Install roll curtain in accordance with paragraph 4-203.

(6) Position draw curtain over window and snap to slides at top and bottom of window.

4-190. PASSENGER SEATS. (U-8F)

4-191. The four passenger seats mount on parallel tracks running length wise through the passenger compartment. The right hand set of mounting tracks runs the entire length of the passenger compartment. The left hand set extends aft to the cabin door. Normally, the forward seats are positioned behind the spar and face aft. The aft seats must always face forward. The forward seats have sliding locks on the back legs to fasten them to the mounting track. Locking pins, actuated by an actuating tube, secure

the aft seats to the mounting tracks. All seats have seat belts, ashtrays, removable cushions, and reclining backs. The reclining back adjusting handle is located beside the front inboard corner of each seat bottom cushion.

a. Removal. (1) Lift sliding locks located on aft legs of forward seats, and rotate locks 90 degrees in either direction.

(2) Move forward seats either forward or aft until seat base fittings align with circular cutouts in mounting track.

(3) Lift forward seats from mounting tracks.

(4) Lift actuating tube and move right hand rear seat to forward position against spar.

(5) Lift right hand rear seat from mounting track.

(6) Remove stop screws from aft end of left hand set of mounting tracks.

(7) Lift actuating tube and slide left hand rear seat aft until it clears end of track.

b. Cleaning. Wipe off seat frames with clean cloth dampened with dry cleaning solvent (item 6, table 1-8) and dry with clean, dry cloth.

c. Inspection. (1) Inspect metal parts of seats for cracks, bends, or broken welds.

(2) Inspect locking mechanism for proper operation.

(3) Inspect seat tracks for cracks and security of installation.

d. Installation. (1) Place right hand rear seat base fitting into slots provided in mounting track.

(2) Slide right hand rear seat aft to desired position.

(3) Align base fittings of forward seats with circular cutouts in mounting tracks and lower forward seats into mounting tracks.

(4) Engage sliding locks on aft legs of forward seats with mounting tracks.

(5) Slide left hand rear seat fittings into aft end of left hand set of mounting tracks.

(6) Install stop screws in aft end of left hand set of mounting tracks.

4-192. PASSENGER SEAT UPHOLSTERY. The passenger seats have foam rubber cushions which are covered with leather and fabric upholstery.

a. Removal. (1) Remove passenger seat from aircraft in accordance with paragraph 4-191.

(2) Remove seat cushion (14, figure 4-29) from seat, unsnap cover, and remove cushion.

(3) Slide stop pins (15) inward, toward center of seat, and rotate pins downward to lock them in retracted position.

(4) Holding adjustment handle (8) up, push seat frame bottom fully aft to free seat tracks (16) from pinions (2) and roller (9).

(5) Using a screwdriver or similar tool, pry open seat catches (13).

(6) Lift seat catches (13) free of mounting pivots (33), and slide seat frame aft out of seat base.

(7) Unsnap back cushion cover to remove cover and cushion from seat frame.

(8) Slip upholstered cover off foam rubber back cushion and frame. Remove cushion from seat.

(9) Remove front base panel (41), side base panel (43), and rear base panel (24) by removing screws (40, 42, and 46).

(10) Pull glued edges of upholstery (44) loose from base panels and slip upholstery off panels (41, 43, and 24).

b. Cleaning. Clean upholstery in accordance with paragraph 1-159.

c. Inspection. (1) Inspect upholstery for fraying, cuts, tears, and broken stitching.

(2) Inspect foam rubber cushions for damage.

d. Installation. (1) Assemble front base panel (41, figure 4-29), side base panel (43), and rear base panel (24). Place upholstery (44) over assembled panels and secure edges of upholstery to panels with cement (item 76, table 1-8).

(2) Position panel assembly against seat base frame and secure with screws (40, 42, and 46).

(3) Sprinkle talc (item 54, table 1-8) inside of back cushion cover and over upper part of back cushion.

(4) Position back cushion against seat back and slip upholstered cover over cushion and back.

(5) Work out all wrinkles in cushion and cover, and straighten seams. Secure cover with snap fasteners.

(6) Slide seat base into seat frame (32) from the rear, so that seat catches (13) hook over mounting pivots (33).

(7) Lock stop pins (15) in retracted position.

(8) Holding adjustment handle (8) in up position, slide seat forward to engage seat tracks (16) between rollers (9) and pinions (2). A screwdriver can be used to help start pinions onto tracks.

(9) Release stop pins (15) by rotating them aft.

(10) Release adjustment handle (8).

(11) Apply talc (item 54, table 1-8) on seat cushion and inside seat cushion cover.

(12) Insert cushion into cushion cover, working out wrinkles and straightening seams.

(13) Fasten cover snaps and place seat cushion (14) on seat frame.

(14) Install passenger seat in accordance with paragraph 4-191.

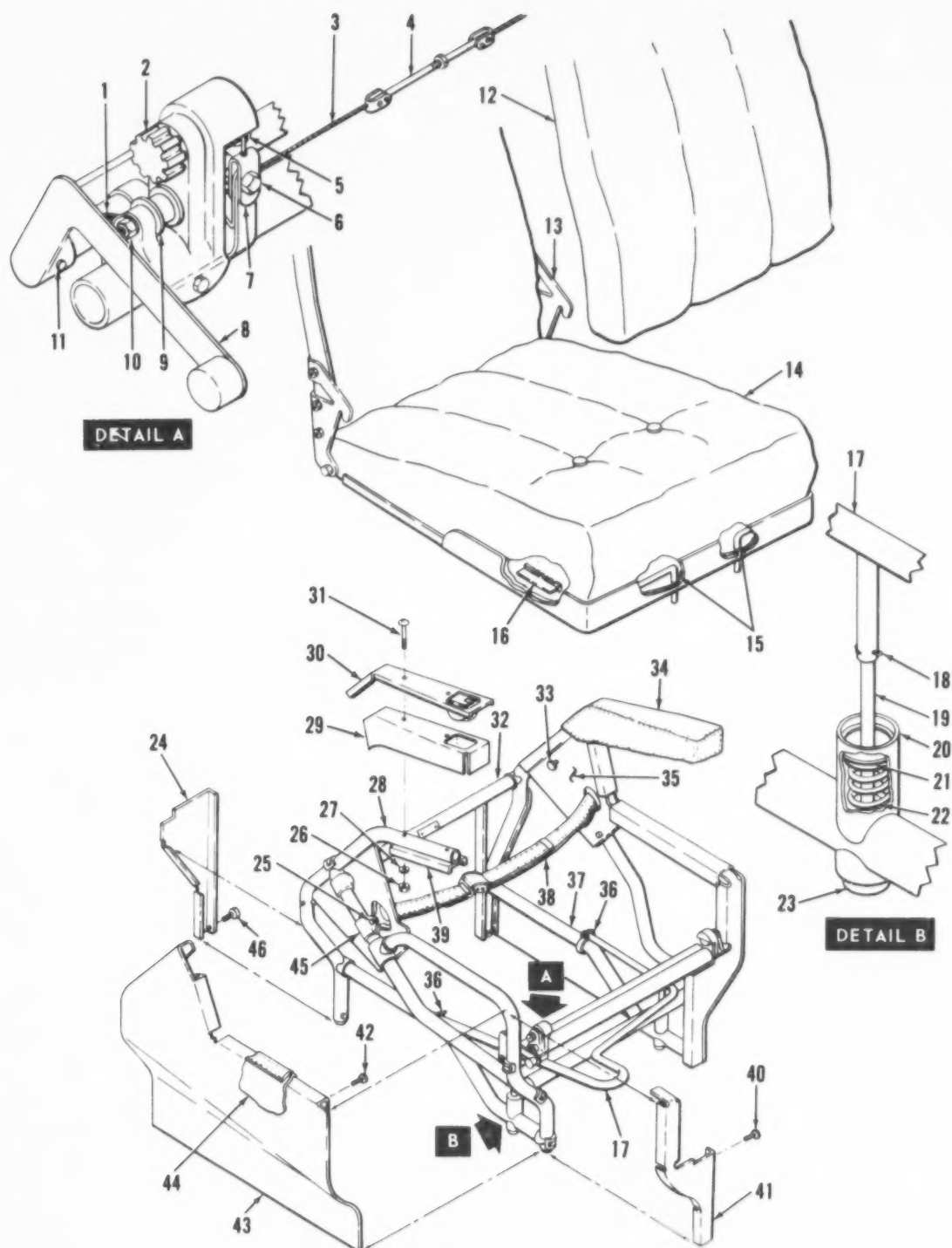


Figure 4-29. Passenger seat (U-8F) (sheet 1 of 2)

1. Spring	13. Seat catch	25. Bolt, washer, nut	36. Pin, cotter pin
2. Pinion	14. Seat cushion	26. Nut	37. Tube
3. Cable	15. Stop pin	27. Washer	38. Seat belt
4. Turnbuckle	16. Seat track	28. Arm	39. Channel
5. Sheave	17. Actuating tube	29. Armrest shell	40. Screw
6. Bolt, washer, nut	18. Cotter pin	30. Armrest cap	41. Front base panel
7. Cable stop bracket	19. Pin	31. Screw	42. Screw
8. Adjustment handle	20. Weld assembly	32. Seat frame	43. Side base panel
9. Roller	21. Washer	33. Mounting pivot	44. Upholstery
10. Bolt, washer nut	22. Spring	34. Armrest upholstery	45. Clamp
11. Bolt, nut	23. Nut	35. Plate	46. Screw
12. Seat back cushion	24. Rear base panel		

Figure 4-29. Passenger seat (U-8F) (sheet 2 of 2)

4-193. FORE-AND-AFT SEAT ADJUSTMENT MECHANISM. The fore-and-aft seat adjustment mechanism is attached to the bottom of the seat frame and is operated by an actuating tube located under the forward edge of the seat. Pulling up on the actuating tube disengages the locking pins from the mounting tracks and allows the seat to move forward or aft.

a. Removal. (1) Remove passenger seat from aircraft in accordance with paragraph 4-191.

(2) Remove cotter pins (18, figure 4-29) from pins (19) and actuating tube (17). Pin (19), with nut (23) attached, spring (22), and washer (21) will drop out of weld assemblies (20).

(3) Remove pins and cotter pins (36) from clamps secured to tubes (37).

(4) Lift actuating tube (17) out of seat frame.

b. Cleaning. (1) Clean actuating tube, pin, spring, washer, and cotter pin with dry cleaning solvent (item 6, table 1-8).

(2) Dry with compressed air.

c. Inspection. (1) Inspect actuating tube for cracks, and bends.

(2) Inspect pin and nut, spring, washer, and cotter pin for damage.

d. Installation. (1) Position actuating tube (17, figure 4-29) in seat frame, align tube ends in clamps on tube (37), and secure with pins and cotter pins (36).

(2) Position spring (22) and washer (21) over pin (19), with nut (23) attached. Insert this assembly in weld assembly (20) and secure pin (19) to actuating tube (17) with cotter pin (18).

(3) Install passenger seat in accordance with paragraph 4-191.

4-194. SEAT RECLINE MECHANISM. The recline adjustment handle, located between the seat cushion and side of seat, releases the seat back locking mechanism so that seat may be adjusted forward or aft. The adjustment handle is springloaded in the locked position.

a. Removal. (1) Remove passenger seat from aircraft in accordance with paragraph 4-191.

(2) Remove seat from seat base in accordance with paragraph 4-192.

(3) Release tension on cable (3, figure 4-29) by loosening turnbuckle (4).

(4) Remove bolt, washer, and nut (6) securing cable stop bracket (7). Unwind cable (3) from sheave (5).

(5) Remove roll pin from pinion (2) and sheave (5). Remove pinion and sheave.

(6) Remove adjustment handle (8) by removing bolt and nut (11).

(7) Remove roller (9) by removing bolt, washers, and nut (10).

(8) Remove spring (1) from tube by removing pin and spacers.

(9) Remove seat tracks (16) from seat by removing screws and washers.

b. Cleaning. Clean parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect parts for cracks, broken teeth, fraying, and corrosion.

d. Installation. (1) Position seat tracks (16, figure 4-29) against bottom of seat and secure with screws and washers.

(2) Secure spring (1) to tube with pin and spacers.

(3) Position roller (9) in bracket and secure roller and other end of spring (1) with bolt, washers, and nut (10).

(4) Secure adjustment handle (8) to tube with bolt and nut (11).

(5) Position pinion (2) and sheave (5) in bracket, and secure with roll pin.

(6) Wind cable (3) on sheave (5) and secure cable stop bracket (7) with bolt, washer, and nut (6).

(7) Tighten cable (3) with turnbuckle (4).

(8) Install seat in seat base in accordance with paragraph 4-192.

(9) Install passenger seat in accordance with paragraph 4-191.

4-195. **ARMRESTS.** Each passenger seat is equipped with left and right upholstered armrests. An ashtray is incorporated in the inboard armrest of each seat.

a. **Removal.** (1) Remove armrest upholstery (34, figure 4-29).

(2) Remove screws (31), washers (27), and nuts (26), from armrest assembly.

(3) Remove armrest cap (30), armrest shell (29), and channel (39) from arm (28).

b. **Cleaning.** (1) Clean metal parts with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

(2) Clean upholstery in accordance with paragraph 1-159.

c. **Inspection.** (1) Inspect upholstery for cuts, burns, fraying, and broken stitches.

(2) Inspect metal parts of armrest for cracks, dents, and corrosion.

d. **Installation.** (1) Position channel (39, figure 4-29) against underside of arm (28), and armrest shell (29) and armrest cap (30) on upper side of arm (28). Align holes and secure with screws (31), washers (27), and nuts (26).

(2) Place armrest upholstery (34) over armrest assembly.

4-196. **SEAT BELTS.** Each passenger seat is equipped with a seat belt to restrain the forward movement of the occupant from his seat in the event of bad weather, sudden deceleration, or a crash landing. The seat belt is secured to each side of the seat frame.

a. **Removal.** (1) Remove seats in accordance with paragraph 4-191.

(2) Remove seat upholstery, if required, in accordance with paragraph 4-192.

(3) Remove bolts, washers, and nuts (25, figure 4-29) from clamps (45) located on side frame tubes.

(4) Remove seat belt (38) by pulling each end fitting through cutouts in plates (35).

b. **Cleaning.** Clean seat belts in accordance with TM 55-1500-204-25/1.

c. **Inspection.** (1) Inspect webbing of seat belts for fraying, cuts, and broken stitches.

(2) Inspect buckles for correct operation.

(3) Inspect seat belt fittings and clamps for cracks.

d. **Installation.** (1) Position each fitting on end of seat belt (38, figure 4-29) through cutouts in plates (35).

(2) Position fittings in clamps (45).

(3) Secure seat belt fittings to clamps (45) with bolts, washers, and nuts (25).

(4) Install seat upholstery, if removed, in accordance with paragraph 4-192.

(5) Install seats in accordance with paragraph 4-191.

4-197. UPHOLSTERY. (U-8F)

4-198. The passenger compartment is upholstered with high quality leather and fabric material. Leather scuff strips are incorporated into the upholstery panel at high wear areas. The passenger compartment has one panel for the ceiling, one panel on each side of the compartment, one forward panel on each side of the compartment separating the doors, and one panel on each side of the door steps.

4-199. **CEILING PANEL.** The passenger compartment has a one-piece ceiling upholstery panel.

a. **Removal.** (1) Remove window curtains in accordance with paragraph 4-204.

(2) Remove screws from window moldings and remove moldings from aircraft.

(3) Remove emergency escape hatch in accordance with paragraph 4-189.

(4) Remove screws securing molding strips along bottom of compartment windows and remove strips.

(5) Remove screws securing curtain tracks, then remove tracks.

(6) Remove screws from each overhead light panel and pull panel partially out.

(7) Disconnect cold air flexible tube

(7) Disconnect cold air flexible tube and light wires from each panel.

(8) Pull upholstery fabric loose from aircraft at all cemented points.

(9) Place hands on each side of one of upholstery seams and push firmly inward to force upholstery retaining wire from retaining clip.

(10) Pull retaining wire from clip.

(11) Repeat steps 9 and 10 above for each seam.

(12) Remove upholstery material from aircraft.

(13) Remove screws securing panels to aircraft and remove panels.

b. **Cleaning.** Clean upholstery in accordance with paragraph 1-159.

c. **Inspection.** (1) Inspect upholstery for fraying, tears, and worn areas.

(2) Inspect stitching for broken threads.

(3) Inspect retaining wire and clips for damage.

d. **Installation.** (1) Place ceiling upholstery panel in position and install retaining screws.

(2) Place two ceiling upholstery panel strips face to face with straight edges aligned.

NOTE

The two upholstery strips may be temporarily joined with pins to facilitate installation.

(3) Place upholstery fabric on left side of retaining strip located just left of aircraft centerline.

(4) Allowing approximately 1/2-inch material lap, start retaining wire in clip and work to opposite end.

NOTE

Maintain the same amount of material lap along the length to the clip.

(5) Work remaining upholstery retaining wires into retaining clips, drawing upholstery tight enough to remove wrinkles as the wire is pressed into place.

(6) Cement edges of upholstery fabric to ceiling panel and aircraft as necessary with cement (item 76, table 1-8).

(7) Connect cold air flexible tube and overhead light wires to each overhead light panel.

(8) Place overhead light panels in position and install retaining screws in each panel.

(9) Place curtain tracks in position and secure with screws.

(10) Position molding strips along bottom of compartment windows and secure with screws.

(11) Install emergency escape hatch in accordance with paragraph 4-189.

(12) Place window moldings in position and secure with screws.

(13) Install window curtains in accordance with paragraph 4-204.

4-200. SIDE PANELS. The passenger compartment has one upholstered panel on each side of the compartment.

a. Removal. (1) Remove passenger seats in accordance with paragraph 4-191.

(2) Unsnap window curtain at bottom.

(3) Remove screws securing window moldings and remove moldings.

(4) Remove emergency escape hatch in accordance with paragraph 4-189.

(5) Remove screws securing molding strips below windows and remove strips.

(6) Remove screws from lower curtain tracks and remove tracks.

(7) With a screwdriver, pry off molding strips over panel retaining strips.

(8) Remove screws installed through retaining strips that secure panel to aircraft.

NOTE

The panel retaining screws may be identified as the larger, unevenly spaced screws.

(9) Pull lower edges of upholstery panels from aircraft at all cemented places.

(10) Pry clip fasteners loose from aircraft and remove panel.

b. Cleaning. Clean upholstered panels in accordance with paragraph 1-159.

c. Inspection. Inspect upholstered panels for fraying, tears, and broken stitches.

d. Installation. (1) Place panel in position and secure clip fasteners.

(2) Install screws through panel retaining strips.

(3) Snap molding strips over panel retaining strips.

(4) Cement lower edges of the panel upholstery to aircraft with cement (item 76, table 1-8).

(5) Place lower curtain track in position and secure with screws.

(6) Place molding in position below cabin windows and secure with screws.

(7) Install emergency escape hatch in accordance with paragraph 4-189.

(8) Place window moldings in position and secure with screws.

(9) Snap window curtains in place.

(10) Install passenger seats in accordance with paragraph 4-191.

4-201. FORWARD PANELS. The forward upholstered panels are located on each side of the sliding door panels.

a. Removal. (1) When removing right forward panel, remove cabin sign in accordance with paragraph 12-231.

(2) Pry molding strips from panel retaining strips.

(3) Remove larger, unevenly spaced screws from retaining strips.

(4) Pry clip fasteners loose and remove panel from aircraft.

b. Cleaning. Clean upholstery in accordance with paragraph 1-159.

c. Inspection. Inspect upholstery for fraying, tears, and broken stitches.

d. Installation. (1) Place panel in position and secure with clip fasteners and screws.

(2) Snap molding strips over panel retaining strips.

(3) Install cabin sign in accordance with paragraph 12-231.

4-202. PASSENGER COMPARTMENT DOOR PANELS. A leather panel is attached to each side of the door steps with retaining strips.

a. Removal. (1) Support door so there is no tension on door support cable.

(2) Remove bolt from cable end and door cable post.

(3) Remove screws from retaining strips and detach strips.

(4) Pry clip fasteners loose and remove upholstery panels from door.

b. Cleaning. Clean upholstery in accordance with paragraph 1-159.

c. Inspection. Inspect panels for fraying, tears, and broken stitches.

d. Installation. (1) Place upholstery panels in position and secure with clip fasteners.

(2) Place retaining strips in position in each end of door and install retaining screws.

(3) Install bolts through door support cable and post.

4-203. CURTAINS. (U-8F)

4-204. Draw curtains and roll curtains are provided on the passenger compartment windows. The draw curtains snap to leather and nylon slides at top and bottom of windows.

a. Removal. (1) Unsnap draw curtains from top and bottom slides and remove curtains.

(2) Extend roll curtain to its extreme limit and hold in place.

(3) Align slot in end of curtain rod (forward end on right side, aft on left side) with hole in pin visible through slot.

(4) Insert a scribe in hole and slide pin out of window frame.

(5) Remove curtain from window frame.

(6) Remove scribe from pin if curtain is to be replaced.

b. Cleaning. Wipe roll curtains with a clean, damp cloth.

c. Inspection. (1) Inspect draw curtains for fraying, cuts, tears, and damaged snaps.

(2) Inspect roll curtains for damage.

d. Installation. (1) Wind flat pin until spring is tight when curtain is fully extended.

(2) Insert scribe in hole in pin through slot in rod.

(3) Shim ends of rod with flat washers until rod fits window frame snugly. Shim both ends approximately same degree.

(4) Insert fixed pin into window frame. Slide springloaded pin into rod and insert pin in slot in window frame.

(5) Check operation of curtain.

(6) Position draw curtains over windows and snap top and bottom of curtains to slides.

4-205. CARPETING. (U-8F)

4-206. The aircraft is carpeted with a durable, tightly woven carpet. The carpet sections are secured to the floor by snap-type fasteners or cement. A curon pad is installed under each carpet section to cushion the carpet. This pad also serves to reduce floor vibration and to lengthen carpet life.

a. Removal. Remove carpeting in accordance with paragraph 4-81.

b. Cleaning. Clean carpeting in accordance with paragraph 1-159.

c. Inspection. Inspect carpeting in accordance with paragraph 4-81.

d. Installation. Install carpeting in accordance with paragraph 4-81.

4-207. FLOOR WEBS AND PANEL ASSEMBLY. (U-8F)

4-208. The passenger compartment has two removable aluminum floor web assemblies, floor-panel and thirteen inspection plates. The floor web assemblies are located just aft of the sliding door partition. The panel assembly is located aft of the main spar in the center aisle. The inspection plates are located under the seats and in floor entrance aisle.

a. Removal.

NOTE

Steps (1) and (2) below are to be accomplished only when floor web assemblies (3 and 7, figure 4-26) are to be removed.

(1) Remove forward seats in accordance with paragraph 4-191 steps a (1) through (3).

(2) Remove forward sections of seat tracks by removing screws securing tracks to webs and aircraft structure.

(3) Remove carpeting, where required, in accordance with paragraph 4-81.

(4) Remove floor web assemblies (3 and 7) by removing screws.

(5) Remove floor panel (4) by removing screws.

(6) Remove inspection plates (5) by removing screws.

b. Cleaning. Clean floor web assemblies, floor panel and inspection plates with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect floor web assemblies, floor panel, and inspection plates for cracks, elongated holes, and corrosion.

d. Installation. (1) Position inspection plate (5, figure 4-26) and secure with screws.

(2) Position floor panel (4) and secure with screws.

(3) Position floor web assemblies (3 and 7) and secure with screws.

(4) Position seat tracks on floor web assemblies (3 and 7) and secure with screws.

(5) Install carpeting in accordance with paragraph 4-81.

(6) Install seats in accordance with paragraph 4-191, steps d(3) and (4).

4-209. RELIEF TUBE. (U-8F)

4-210. The passenger compartment relief tube (13, figure 4-27) is secured to the baggage compartment upholstered panel on the right hand side by a clamp (14). The tube is routed through grommets in the baggage compartment upholstered panel and fuselage skin to a venturi mounted to the underside of the aircraft.

a. Removal. (1) Remove carpeting from baggage compartment floor panel in accordance with paragraph 4-81.

(2) Remove floor panel (6, figure 4-26) by removing screws.

(3) Remove tape and lock from each end of relief tube (13, figure 4-27). Detach relief tube from relief tube horn (12) and venturi (16).

(4) Remove clamp (14), screws (17), and relief tube (13) from aircraft.

(5) Remove bracket (10) by removing screw (11).

b. Cleaning. Clean relief tube in accordance with paragraph 1-161.

c. Inspection. (1) Inspect horn and venturi for cracks.

(2) Inspect tube for deterioration.

d. Installation. (1) Position bracket (10, figure 4-27) on cabin upholstered panel and secure with screw (11).

(2) Route relief tube (13) between venturi (16) and bracket (10).

(3) Attach tube to venturi (16) and horn (12) and secure with lock wire and insulation tape (item 53, table 1-8).

(4) Secure relief tube (13) to aircraft structure with clamp (14) and screws (11).

(5) Position floor panel (6, figure 4-26) and secure with screws.

(6) Install carpeting in accordance with paragraph 4-81.

4.211. FIRST AID KIT. (U-8F)

4-212. A first aid kit (1, figure 4-27) is attached by four snap fasteners to a bracket located beneath the baggage compartment shelf.

4-213. BAGGAGE COMPARTMENT. (U-8F)

4-214. The baggage compartment is located in the rear of the passenger compartment and has two large shelves with a combined capacity of 300 pounds. The baggage compartment is upholstered and is equipped with a coat rack, webbing assemblies, carpeting, and a floor panel.

4-215. BAGGAGE COMPARTMENT UPHOLSTERY. (U-8F)

4-216. The baggage compartment is upholstered with four panels, two on the aft bulkhead, and one on each side of the lower baggage shelf.

a. Removal. (1) Remove screws from oxygen gage escutcheon and remove escutcheon.

(2) Pry clip fasteners loose on upper aft panel and remove panel.

(3) Release quick-release fasteners on aft fuselage section access panel and remove panel.

(4) Pry clip fasteners loose on small panels on each side of access panel opening and remove panels.

(5) Remove right cabin side upholstery panel in accordance with paragraph 4-200.

(6) Pull cemented areas of side panels loose from aircraft.

(7) Remove screws securing relief horn bracket and tubing to aircraft.

(8) Pry clip fasteners loose from aircraft and remove panels.

NOTE

The right panel will have to be worked free of relief tube.

b. Cleaning. Clean upholstery in accordance with paragraph 1-159.

c. Inspection. (1) Inspect upholstery for fraying, cuts, or tears.

(2) Inspect clip fasteners for condition.

d. Installation. (1) Work right side panel into position over relief tube and secure clip fasteners.

(2) Place left panel in position and secure clip fasteners.

(3) Install relief tube horn bracket and tubing with screws.

(4) Cement forward edges of side panels to aircraft with cement (item 76, table 1-8).

(5) Install right passenger compartment side upholstery panel in accordance with paragraph 4-200.

(6) Clip small side panels in place on each side of aft fuselage section access opening.

(7) Place lower panel in place and secure quick-release fasteners.

(8) Place upper panel in position and secure with clip fasteners.

(9) Position oxygen gage escutcheon and secure with screws.

4-217. COAT RACK. (U-8F)

4-218. A coat rack is installed in the baggage compartment in line with the forward edge of the baggage shelf.

a. Removal. (1) Remove screws at each end of coat rack which fastens webbing assembly clips to coat rack and roof former.

(2) Remove remaining screws securing coat rack and remove coat rack.

b. Cleaning. Clean coat rack with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8) and dry with a soft, clean cloth.

c. Inspection. Inspect coat rack for cracks, bends, and elongated mounting holes.

d. Installation. (1) Position coat rack and install screws not securing webbing assembly clips.

(2) Position webbing assembly clips on coat rack and secure with screws.

4-219. WEBBING ASSEMBLIES. (U-8F)

4-220. The baggage compartment is equipped with webbing assemblies which secure the luggage on the upper and lower shelves.

a. Removal. Remove screws securing upper and lower webbing assembly clips and remove webbing assemblies.

b. Cleaning. Clean webbing assemblies in accordance with paragraph 1-159.

c. Inspection. Inspect webbing for elasticity and clips for cracks or bends.

d. Installation. Position webbing assembly clips and secure with screws.

4-221. BAGGAGE COMPARTMENT UPHOLSTERY. (U-8F)

4-222. The baggage compartment floor and shelf are covered with durable, tightly woven carpet

sections.

a. Removal. Remove carpeting in accordance with paragraph 4-81.

b. Cleaning. Clean carpeting in accordance with paragraph 1-159.

c. Inspection. Inspect carpeting for fraying, tears, and excessive wear.

d. Installation. Install carpeting in accordance with paragraph 4-81.

4-223. BAGGAGE COMPARTMENT FLOOR PANEL. (U-8F)

4-224. The baggage compartment floor is covered with an aluminum panel.

a. Removal. (1) Remove carpeting in accordance with paragraph 4-81.

(2) Remove floor panel (6, figure 4-26) by removing screws.

b. Cleaning. Clean floor panel with dry cleaning solvent (item 6, table 1-8) and dry with compressed air.

c. Inspection. Inspect floor panel for cracks, elongated holes, and corrosion.

d. Installation. (1) Position floor panel (6, figure 4-26) and secure with screws.

(2) Install carpeting in accordance with paragraph 4-81.

4-225. AFT FUSELAGE.

4-226. The aft fuselage (figures 4-3, 4-4, and 4-5) is accessible by removing a panel on the rear bulkhead of the baggage compartment. This permits servicing, inspection, and repair of any control system or avionic component located in the aft fuselage.

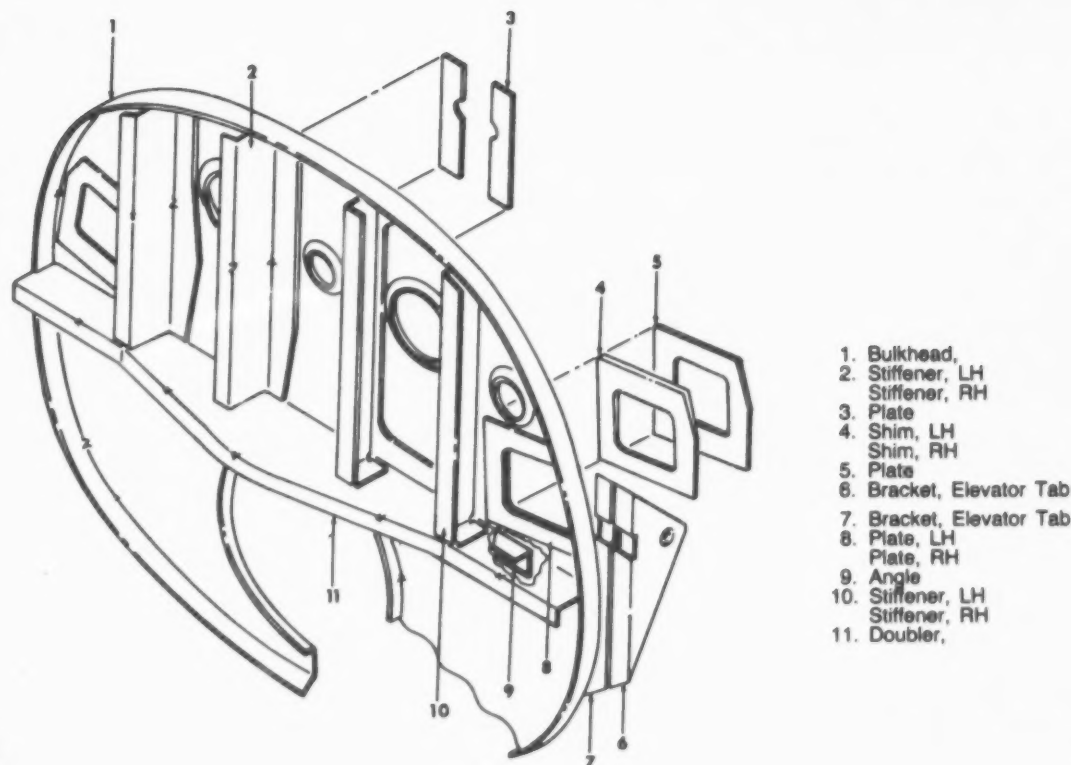
4-226A. FS 380.0 BULKHEAD.

4-226B. The FS 380.0 bulkhead is the final bulkhead of the aft section. The horizontal stabilizer and tail cone are attached to this bulkhead.

a. Cleaning. Clean in accordance with paragraph 1-159.

b. Inspection. (1) Using a light and mirror, inspect all the stiffeners and other components attached to the bulkhead. Particular attention should be given to the edges of these parts where they have been formed, the areas around their attaching rivets and the contact areas under the aft spar attach bolts nut. If cracks are found, repair must be accomplished at general support or depot level in accordance with TM 55-1500-204-25/1.

(2) If one or more of the four vertical stiffeners or the doubler (items 2, 10, and 11, Figure 4-29A)



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Figure 4-29A

F.S. 380.00 Bulkhead

require replacement, it is recommended that all four of the vertical stiffeners and the doubler be replaced at the same time.

NOTE

One rivet hole may have been eliminated from each of the vertical stiffeners; rivets are not to be installed at these points. Existing holes through the bulkhead do not need to be plugged.

(3) If the bulkhead is cracked, it may be replaced or repaired, if practical, as outlined in TM 55-1500-204-25/1.

4-227. TAIL CONE.

4-228. The tail cone (figures 4-3, 4-4, and 4-5) is formed of fiberglass and continues the lines of the aircraft. Removal of the tail cone permits easy access to empennage control components. The aft navigation light is incorporated in the tail cone.

a. Removal. (1) Remove screws securing tail cone to fuselage.

(2) Pull tail cone straight back from fuselage to gain access to navigation light wires.

(3) Disconnect wires, one at quick disconnect splice and other from airframe.

b. Cleaning. Clean tail cone in accordance with paragraph 1-159.

c. Inspection. Inspect tail cone for scratches, cracks, and damaged mounting holes.

d. Installation. (1) Connect navigation light wires.

(2) Position tail cone on fuselage and secure with screws.

4-60A/(12-80B blank)

SECTION III EMPENNAGE SECTION

4-229. DESCRIPTION.

4-230. The empennage (figure 4-30) consists of the dorsal fin, horizontal stabilizers, vertical stabilizer, elevators, and rudder. The elevators and rudder have variable incidence and are discussed with the other moveable flight controls. (Refer to Chapter 9, Section II.)

4-231. DORSAL FIN.

4-232. The dorsal fin (1, figure 4-30) is located on the tail section of the fuselage just forward

of the vertical stabilizer (3). The dorsal fin is attached to the tail section of the fuselage with rivets and to the vertical stabilizer with screws. A rubber fairing (2) is installed between the trailing edge of the dorsal fin and the vertical stabilizer on the U-8D, U-8G, and RU-8D aircraft.

a. Cleaning. Clean dorsal fin in accordance with paragraph 1-159.

b. Inspection. (1) Inspect dorsal fin for cracks, dents, holes, and security of attachment.

(2) Inspect rubber fairing for deterioration and security of attachment on U-8D, U-8G, and RU-8D aircraft.

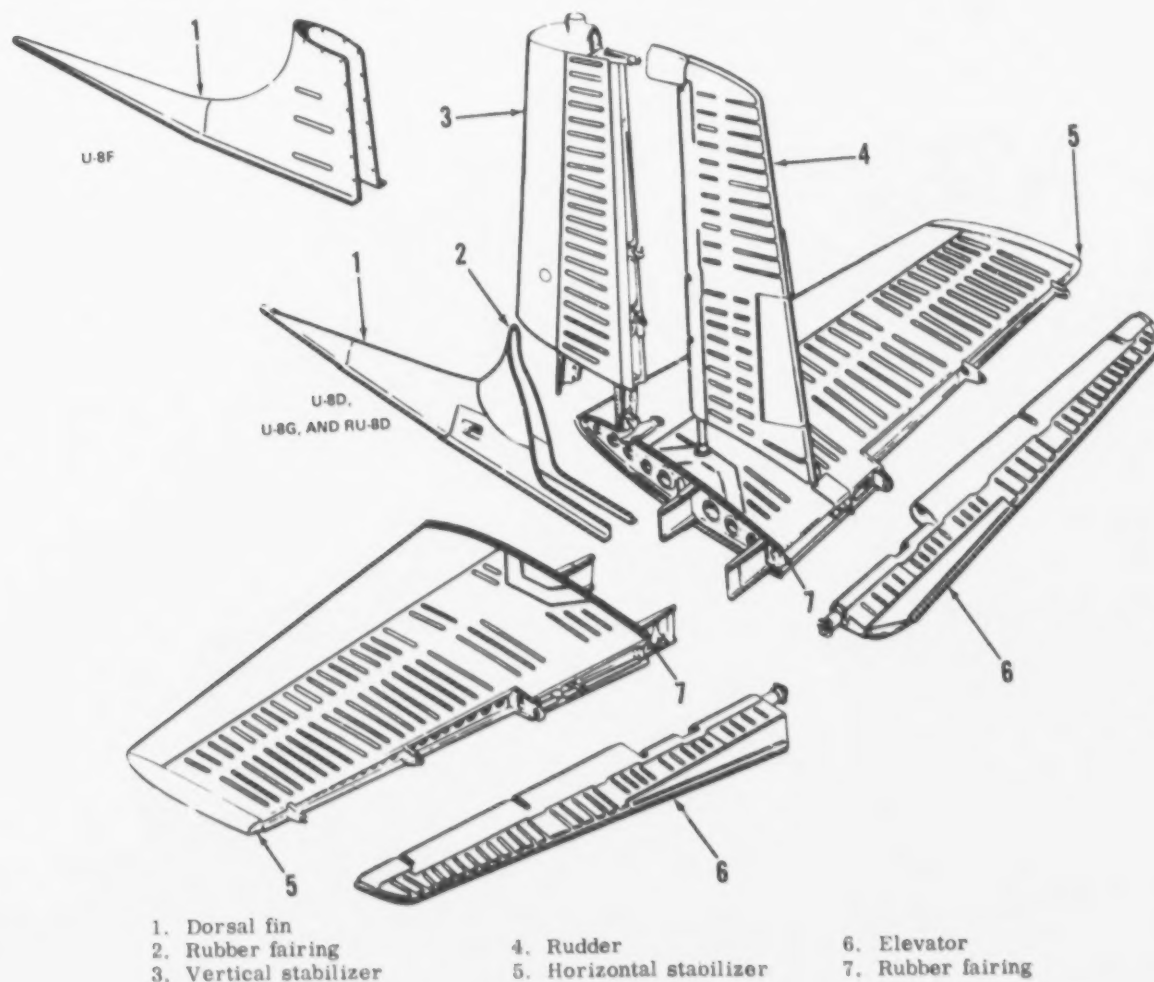


Figure 4-30. Empennage installation

4-233. HORIZONTAL STABILIZERS.

4-234. The horizontal stabilizers (5, figure 4-30) consists of ribs and spars covered by an aluminum alloy skin. The spars that protrude on the inboard end of each horizontal stabilizer are attached to the fuselage structure in the tail section. The brackets for attaching the elevators (6) are mounted to the rear spar of each horizontal stabilizer. Rubber fairings (7) are installed to seal the opening between the fuselage skin and the inboard edge of each horizontal stabilizer skin.

a. Cleaning. Clean horizontal stabilizers in accordance with paragraph 1-159.

b. Inspection. (1) Inspect horizontal stabilizers for cracks, dents, holes, loose or missing rivets, and security of attachment.

(2) Inspect brackets on trailing edges of horizontal stabilizers for cracks, dents, bends, and security of attachment.

(3) Inspect rubber fairings for deterioration and security of attachment.

4-235. VERTICAL STABILIZERS.

4-236. The vertical stabilizer (3, figure 4-30) consists of ribs and spars covered by an aluminum alloy skin. The spars that protrude on the lower end of the vertical stabilizer are attached to the fuselage structure in the tail section. The brackets for attaching the rudder (4) are mounted on the rear spar of the vertical stabilizer.

a. Cleaning. Clean vertical stabilizer in accordance with paragraph 1-159.

b. Inspection. (1) Inspect vertical stabilizer for cracks, dents, holes, loose or missing rivets, and security of attachment.

(2) Inspect brackets on trailing edge of vertical stabilizer for cracks, dents, bends, and security of attachment.

(3) Inspect rubber fairings for deterioration and security of attachment.

SECTION IV PYLON SECTION

Not Applicable

SECTION V WING SECTION**4-237. DESCRIPTION.**

4-238. The all-metal wings for the U-8 aircraft consist of the center wing, two outboard wings, two wing tips, and access covers and doors. The wing flaps and ailerons are attached to brackets on the trailing edge of the wings.

4-239. CENTER WING.

4-240. The primary structure of the center wing (figure 4-31) consists of the front and rear spars, ribs, and skin. The nacelles for the engines are mounted on the front spars of the center wing on each side of the fuselage. A battery box is located in each nacelle, with a cabin door stop located on the right nacelle (U-8D, U-8G, and RU-8D). In the U-8F, a battery box is located in the top of the left hand engine nacelle. The portion of each nacelle aft of the firewall is an integral part of the center wing. Fittings are installed on the outboard ends of the center wing spars for attaching the outboard wings. The leading edges of the center wing are removable.

a. Cleaning. Clean center wing in accordance with paragraph 1-159.

b. Inspection. (1) Remove access covers and open access doors to gain access to ribs, spars, and inner surface of skin.

(2) Inspect spars and ribs for cracks, buckling, corrosion, and security of attachment.

Inspect all exposed areas of the upper and lower spar caps for paint blisters, raised areas and/or unevenness and cracks in the metal. Paint blisters could be caused by corrosion; therefore, if blisters are detected during the visual inspection, the area of the blister should be examined closely for unevenness and/or raised areas and cracks in the metal. The exposed areas of the spar caps are extruded flat; therefore, areas of unevenness and/or raised areas on the spar caps should indicate corrosion and should be considered suspect areas. (See Figure 4-32A).

NOTE

Areas of unevenness and/or raised areas on the spar caps may be detected by sliding the fingers over the surface or by moving a straightedge over the spar cap.

(3) Inspect skin of center wing for cracks, dents, holes, corrosion, loose or missing rivets, and condition of paint.

(4) Install access covers and close access doors.

4-241. CENTER WING LEADING EDGES.

4-242. The center wing leading edges are located on the leading edges of the center wing on each side of the fuselage. The center wing leading edges are removed to gain access to the engine controls.

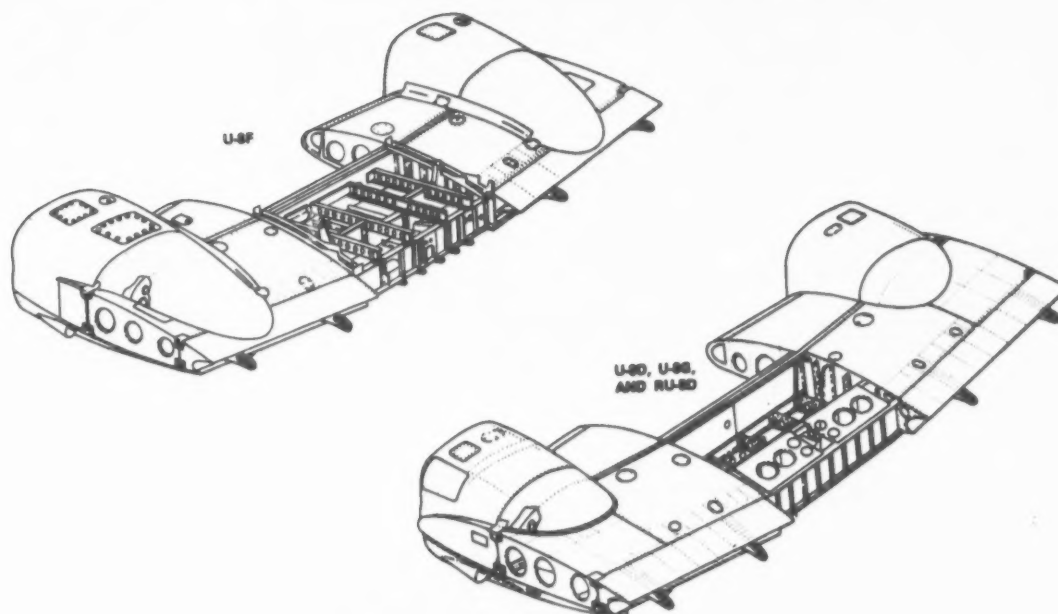


Figure 4-31. Center wing

a. Removal. (1) Remove screws securing clips on rubber fairings (U-8D, U-8G, and RU-8D) or inboard and outboard fillets on center wing leading edges (U-8F). Remove clips or inboard and outboard fillets.

(2) Remove screws securing leading edges on center wing and remove leading edges.

b. Cleaning. Clean center wing leading edges in accordance with paragraph 1-159.

c. Inspection. (1) Inspect center wing leading edges for cracks, dents, holes, and corrosion.

(2) Inspect rubber fairings (U-8D, U-8G, and RU-8D) for deterioration and security of attachment.

d. Installation. (1) Position center wing leading edges on center wing and secure with screws.

(2) Position clips on rubber fairings (U-8D, U-8G, and RU-8D) or inboard and outboard fillets fairings on center wing leading edges (U-8F) and secure with screws.

4-243. BATTERY BOX.

4-244. In the U-8D, U-8G, and RU-8D, a battery box is located in each nacelle on the center wing. Battery hold down blocks secure the battery in position in each battery box. In the U-8F,

a battery box is located in the top of the left hand engine nacelle. A clevis assembly secures the battery in position in the nacelle.

a. Cleaning. (1) Remove battery hold-down blocks and remove batteries in accordance with paragraph 12-167 or 12-177.

(2) Clean battery boxes in accordance with paragraph 1-159.

b. Inspection. (1) Inspect battery boxes for cracks, dents, corrosion, and condition of paint.

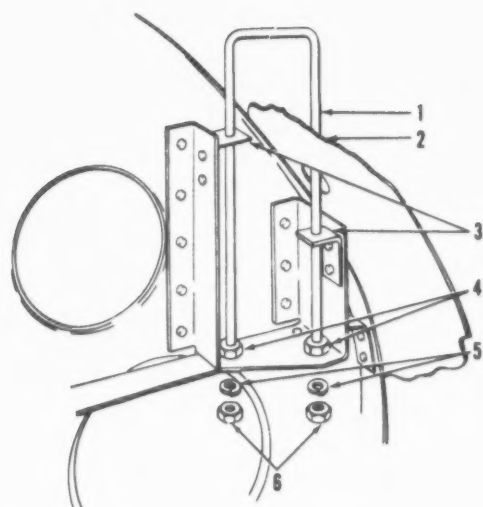
(2) Paint battery boxes in accordance with TB 746-93-2.

(3) Install batteries and secure with hold-down blocks in accordance with paragraphs 12-167 or 12-177.

4-245. FLIGHT COMPARTMENT DOOR STOP. (U-8D, RU-8D)

4-246. The flight compartment door stop (1, figure 4-32) is installed in the right nacelle on the center wing. The flight compartment door stop is used to secure the flight compartment door in the open position.

a. Removal. (1) Remove augments tube from right nacelle in accordance with paragraph 5-86 or 5-88.



- | | |
|---------------------------|------------|
| 1. Cabin door stop | 4. Nuts |
| 2. Right nacelle | 5. Washers |
| 3. Upper support brackets | 6. Nuts |

Figure 4-32. Cabin door stop (U-8D and RU-8D)

(2) Remove nuts (6, figure 4-32) and washers (5) from lower ends of flight compartment door stop (1).

(3) List flight compartment door stop (1) from lower support brackets and remove nuts (4).

(4) Remove flight compartment door stop (1) from upper support brackets (3) and right nacelle (2).

b. Cleaning. Clean door stop with dry cleaning solvent (item 6, table 1-8) and dry with clean, dry cloth.

c. Inspection. Inspect door stop for cracks, bends, and malformed threads.

d. Installation. (1) Position flight compartment door stop (1, figure 4-32) through right nacelle (2) and upper support brackets (3).

(2) Install nuts (4) on each end of flight compartment door stop (1) and insert ends in lower support bracket.

(3) Position flight compartment door latch on door stop (1) and adjust nuts (4) until door stop is in proper position.

(4) Install washers (5) and nuts (6) on each end of flight compartment door stop (1) and tighten nuts.

(5) Install augments tube on right nacelle in accordance with paragraph 5-86 or 5-88.

4-247. OUTBOARD WINGS.

4-248. The outboard wings (2, figure 4-33) are attached to the outboard ends of the center wing on each side of the fuselage. Each outboard wing consists of the leading edge assembly, spar assembly, and panel assembly. The leading edge assembly and panel assembly are attached to the spar assembly by piano-type hinges. Each leading edge assembly has a landing light pane (3). In addition, the left leading edge assembly has a stall warning sensing unit. (Refer to paragraph 12-159 for maintenance of the stall warning sensing unit.)

a. Cleaning. Clean outboard wing in accordance with paragraph 1-159.

b. Inspection. (1) Remove access covers and open access door to gain access to interior components of outboard wings.

(2) Inspect ribs and spars for cracks, buckling, corrosion, and loose or missing rivets. Inspect all exposed areas of the upper and lower spar caps for paint blisters, raised areas and/or unevenness and cracks in the metal. Paint blisters could be caused by corrosion; therefore, if blisters are detected during the visual inspection, the area of the blister should be examined closely for unevenness and/or raised areas and cracks in the metal. The exposed areas of the spar caps are extruded flat; therefore, areas of unevenness and/or raised areas on the spar caps could indicate corrosion and should be considered suspect areas. (See Figure 4-32A).

NOTE

Areas of unevenness and/or raised areas on the spar caps may be detected by sliding the fingers over the surface or by moving a straightedge over the spar cap.

(3) Inspect skin for cracks, dents, holes, corrosion, and loose or missing rivets.

(4) Install access covers and close access doors.

4-249. LANDING LIGHT PANES.

4-250. The landing light panes (3, figure 4-33) are installed on the leading edges of outboard wings (2). Each landing light pane is a sheet of acrylic plastic formed to the contour of the leading edge of each outboard wing with a rubber seal around the edges. The landing light panes cover the recess for the landing lights. The top of each landing light pane is painted black to reduce glare in the flight compartment.

a. Removal. (1) Remove screws securing retainers for landing light panes (3, figure 4-33) on leading edges of outboard wings (2). Remove retainers.

(2) Remove landing light panes (3) from leading edges of outboard wings (2).

b. Cleaning. Clean landing light panes in accordance with paragraph 1-159.

c. Inspection. (1) Inspect landing light

panes for cracks, scratches, and crazing.

(2) Inspect retainers for cracks and dents; rubber seal for security of attachment.

d. Installation. (1) Position landing light panes (3, figure 4-33) on leading edges of outboard wings (2).

(2) Position retainers on landing light panes and secure with screws.

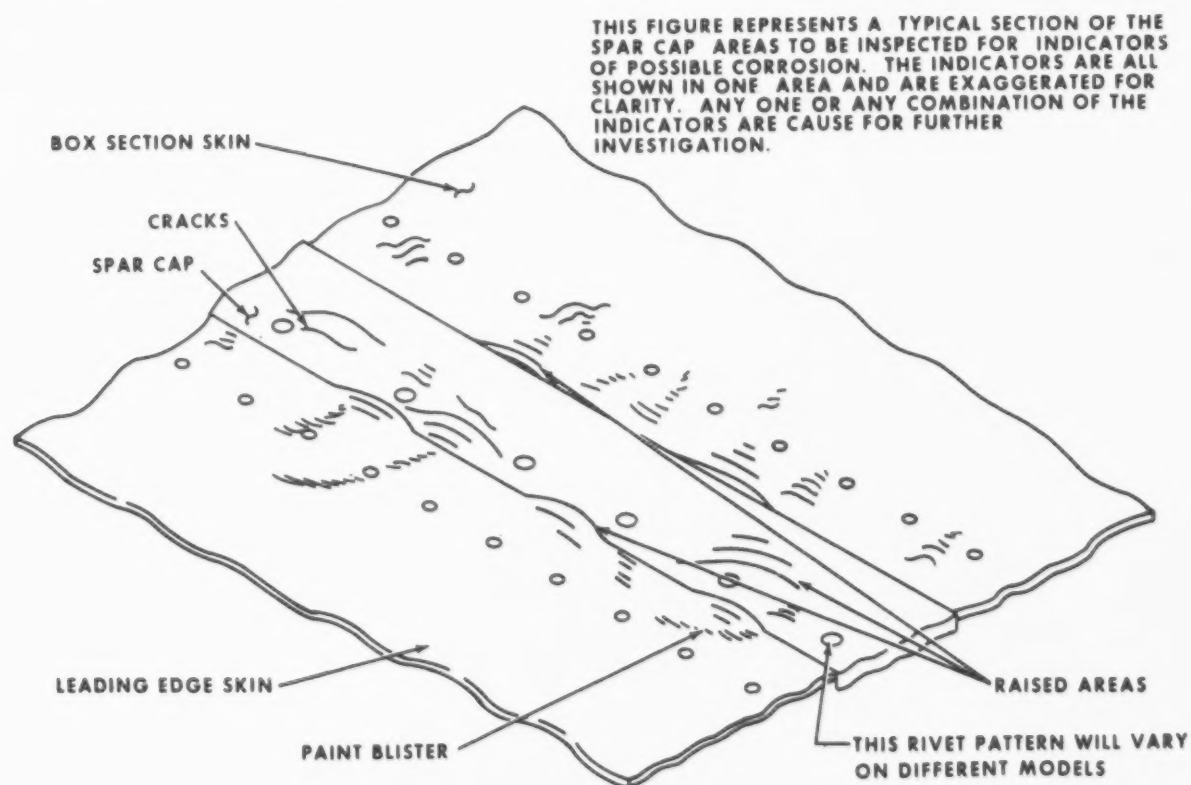


Figure 4-32A Spar cap inspection

4-251. WING TIPS.

4-252. A wing tip (1, figure 4-33) is installed on the outboard end of each outboard wing (2). The wing tips are formed from two sheets of aluminum spot welded together. A navigation light is mounted on the outboard end of each wing tip on U-8D, U-8G, U-8F, and one on top and one on bottom of the RU-8D wing tip.

a. Cleaning. Clean wing tips in accordance with paragraph 1-159.

b. Inspection. Inspect wing tips for cracks, dents, holes, broken welds, and security of attachment.

4-253. ACCESS COVERS AND DOORS.

4-254. Access covers and doors are installed on the center and outboard wings for gaining access to components installed in the wings. The access covers are secured to the wing structure with screws, and the access doors are secured to the wing structure with screws, fasteners or latches, and hinge pins. See figures 1-7 and 1-8 for locations of access covers and doors.

a. Removal. (1) Remove screws and remove access covers from wing structure.

(2) Remove screws or unfasten latches or fasteners, as necessary, and open access doors to gain access to hinge pins.

(3) Drive hinge pins out of hinges far enough to grasp with pliers, using a 3/16-inch diameter punch.

CAUTION

Do not damage skin of wings when driving hinge pins from hinges.

(4) Grasp end of each hinge pin with pliers and pull from hinge. Remove each access door.

b. Cleaning. Clean access covers and doors with dry cleaning solvent (item 6, table 1-8) and dry with clean, dry cloth.

c. Inspection. Inspect access covers and doors for cracks, bends, dents, and corrosion.

d. Installation. (1) Position access covers on access holes in wing structure and secure with screws. Ensure that access covers fit properly.

(2) Position hinge half on each access door on hinge half on wing structure and drive in hinge pin.

(3) Close access doors and secure with screws, fasteners, or latches. Ensure that access doors fit properly.

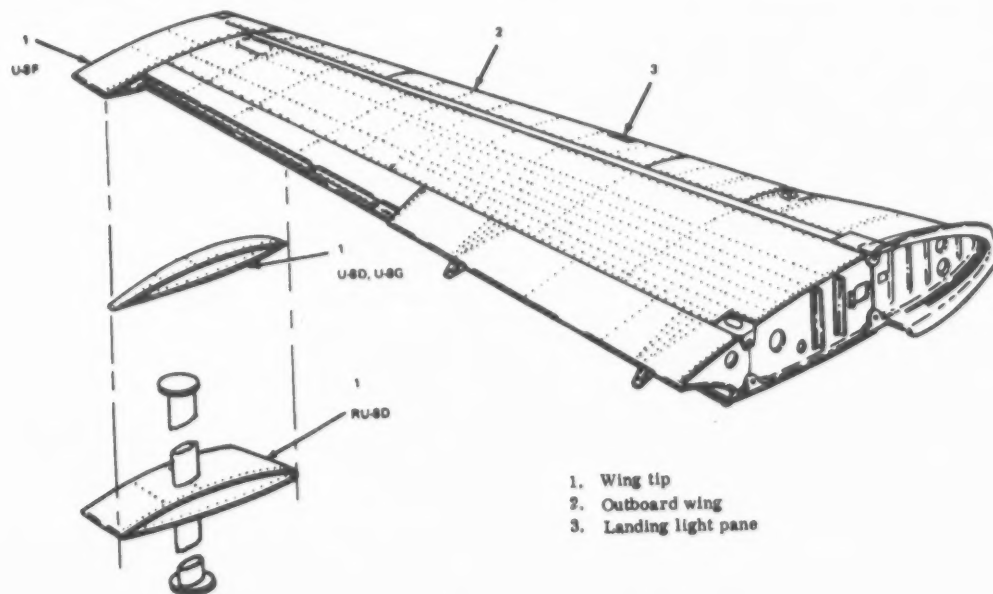


Figure 4-33. Outboard wing and wing tip installation

SECTION VI ALIGHTING GEAR

4-255. DESCRIPTION.

4-256. The alighting gear for the U-8 aircraft is the electrically operated tricycle-type alighting gear. The alighting gear consists of two main landing gear assemblies, nose landing gear assembly, landing gear retraction system, emergency extension system, and landing gear door assemblies. For maintenance of the electrical components of the alighting gear, refer to paragraphs 12-39 through 12-98.

4-257. MAIN LANDING GEAR ASSEMBLIES.

4-258. There are two main landing gear assemblies (figure 4-34) installed on the U-8 aircraft. Each main landing gear assembly consists of a main wheel and tire assembly, brake assembly, shock absorber assembly, drag brace assembly, down lock mechanism, torque knee assembly, side brace assembly, and top brace assembly. A drag brake shoe assembly is installed in each main wheel well to stop main wheel assembly from turning after the main landing gear assembly is retracted.

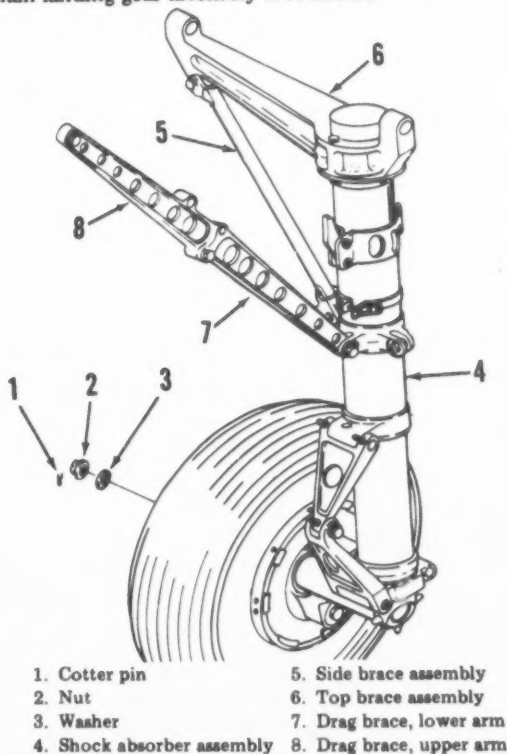


Figure 4-34. Main landing gear assembly

4-259. MAIN WHEEL AND TIRE ASSEMBLIES.

4-260. Each main wheel assembly (figure 4-35) consists of a tire, tube, and wheel as one assembly. Bearing cups items (9) and (10) are installed in the hub of the outboard and inboard wheel sides. Cone and rollers (3) are installed in cup (10) and cone and rollers (7) are installed in cup (9). Ten keys (8) are installed on the flange of the inboard wheel side for the mounting of the brake disc.

a. Removal. (1) Jack aircraft in accordance with paragraph 1-93.

(2) Remove valve core from valve stem and deflate tube. Remove retaining ring (1) figure 4-35, grease cap (2), cotter pin (1, figure 4-34), nut (2), washer (3), and cone and rollers (3, figure 4-35) from outboard wheel side, securing each main wheel and tire assembly on axle. Support brake disc (1, figure 4-36) and remove each main wheel and tire assembly.

CAUTION

Support brake disc while removing main wheel and tire assembly to prevent brake disc from dropping out of position and damaging brake disc or brake assembly housing (5, figure 4-36).

(3) Remove retaining ring (4, figure 4-35), washers (5 and 6) and cone and rollers (7) from inboard wheel side.

b. Cleaning. (1) Clean all metal parts of main wheel with dry cleaning solvent (item 6, table 1-8) and dry with filtered compressed air.

(2) Clean tire with a mild solution of soap (item 23, table 1-8) and water. Rinse in clear water and allow to dry.

c. Inspection. (1) Inspect wheel for corrosion, cracks, dents, and out-of-round condition.

(2) Inspect keys on inboard side for burrs, dents, and security of attachment.

(3) Inspect cups, cones and rollers in accordance with TM 55-1510-204-25/1, Chapter 3, section 2.

(4) Ensure cone and rollers seat properly on axle and in both sides of wheel bearing cup.

(5) Inspect tires for cracks, cuts, breaks, worn spots, and embedded foreign objects.

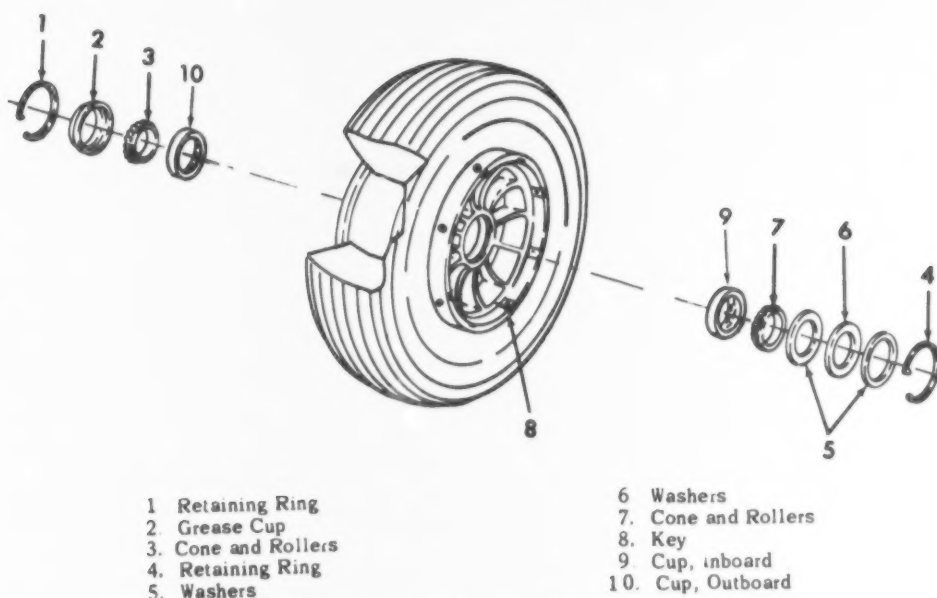


Figure 4-35. Main wheel and tire assembly

d. Installation. (1) Install valve core in valve stem and inflate tire and tube in accordance with paragraph 1-142.

(2) Pack cones and rollers (3 and 7) with grease (item 62, table 1-8).

NOTE

When aircraft is to operate in extreme low temperature, pack cones and rollers with grease (item 50, table 1-8).

(3) Lightly coat axle, wheel hub interior, and cups with grease (item 62, table 1-8).

(4) Position cone and rollers (7) and washers (5 and 6) in inboard wheel side and secure with retaining ring (4).

(5) Position main wheel and tire assembly on axle, and brake disk on keys (8) of inboard wheel side.

(6) Install cone and rollers (3, figure 4-35), washer (3, figure 4-34) and nut (2). Tighten nut enough to eliminate all side play, ensure that cones and rollers (3 and 7, figure 4-35) are seated properly and produce a wheel drag.

NOTE

Do not confuse wheel drag with brake drag.

(7) Back off nut (2, figure 4-34) just enough to allow main wheel and tire assembly to turn freely.

(8) Install cotter pin (1) and bend and clip ends. Install grease cap (2, figure 4-35) and secure retaining ring (1).

(9) Lower jacks and remove from aircraft.

4-261. BRAKE ASSEMBLIES.

4-262. A brake assembly (figure 4-36) is mounted on a flange on the axle at inboard side of each main wheel assembly. The brake assemblies are actuated by hydraulic fluid pressure from the brake hydraulic system. Each brake assembly consists of a brake disc and brake assembly housing. The brake disc is held in position by the keys installed on each inboard wheel side. The brake assembly housing contains three interconnected cylinders and six brake linings, three moveable and three stationary.

a. Removal. (1) Jack aircraft in accordance with paragraph 1-93.

(2) Remove main wheel and tire assembly in accordance with paragraph 4-259.

(3) Remove screw (9, figure 4-36) and washer (8) from bleeder valve on brake assembly housing (5), and open bleeder valve to drain

hydraulic fluid from brake hydraulic system and brake assembly housing. Close bleeder valve.

(4) Disconnect hydraulic line from brake assembly housing (5), and cap end of hydraulic line and open port in brake assembly housing.

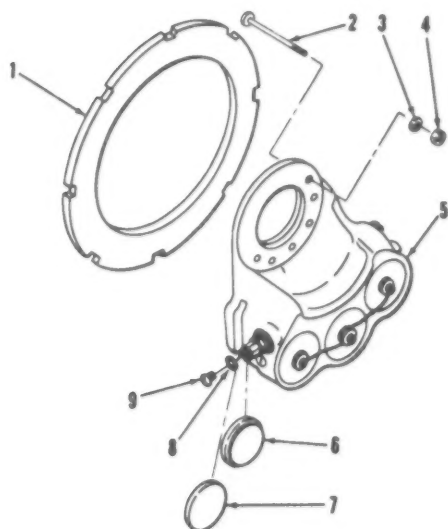
(5) Remove bolts (2), washers (3), and nuts (4) securing brake assembly housing (5) to flange on axle and remove brake assembly housing.

(6) Remove brake disc (1) from brake assembly housing (5).

(7) Remove stationary brake linings (7) from brake assembly housing (5) and moveable brake linings (6) from ends of piston in brake assembly housing, if brake linings are worn.

NOTE

All brake linings on an individual wheel assembly should be replaced when any one adjusting pin has receded to a point where 1/16 inch to 3/32 inch remains exposed outside the packing nut.



- | | |
|---------------------------|----------------------------|
| 1. Brake Disk | 6. Moveable brake lining |
| 2. Bolt | 7. Stationary brake lining |
| 3. Washer | 8. Washer |
| 4. Nut | 9. Screw |
| 5. Brake assembly housing | |

Figure 4-36. Brake assembly

b. Cleaning. Clean brake assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect brake assembly housing for cracks, dents, and corrosion.

(2) Inspect brake disk for a minimum thickness of 0.337 inch and key slots for a maximum width of 1.189 inches.

(3) Inspect brake disk for warping (usually caused by excessive heat), dents, burrs, and excessive scoring.

d. Installation. (1) Install stationary brake linings (7, figure 4-36) in brake assembly housing (5) and moveable brake linings (6) in pistons in brake assembly housing.

(2) Press moveable brake linings (6) and pistons into brake assembly housing (5) and position brake disk (1) between moveable brake linings and stationary brake linings (7).

(3) Position brake assembly onto flange on axle and secure with bolts (2), washers (3), and nuts (4).

(4) Install main wheel and tire assembly in accordance with paragraph 4-259.

(5) Remove caps from hydraulic line and port in brake assembly housing (5). Connect hydraulic line to brake assembly housing.

(6) Bleed brake hydraulic system in accordance with paragraph 6-7 and install washer (8) and screw (9).

(7) Lower jacks and remove from aircraft.

4-263. SHOCK ABSORBER ASSEMBLIES.

4-264. The shock absorber assemblies (4, figure 4-34) of the main landing gear assemblies are the air and hydraulic fluid type. Each shock absorber assembly consists of an upper and lower shock absorber. The upper shock absorber has a rebound control that controls the flow of hydraulic fluid between the upper and lower shock absorbers. The lower shock absorber has an axle installed for mounting the main wheel and tire assembly. A torque knee assembly is connected to the upper and lower shock absorber to prevent the lower shock absorber from turning in the upper shock absorber.

4-265. DRAG BRACE ASSEMBLIES.

4-266. A drag brace assembly is attached to the forward side of each shock absorber assembly on the main landing gear assembly. Each drag brace assembly consists of a lower arm (7, figure 4-34) and upper arm (8). A down lock mechanism is installed on each drag brace assembly.

4-267. DOWN LOCK MECHANISMS.

4-268. A down lock mechanism is installed on each drag brace assembly on each main landing gear assembly. The down lock mechanism consists of a link, two springs, two lock hooks, and a lock pin. When the main landing gear assembly is fully extended, the down lock mechanism locks the lower and upper arms of the drag brace assembly together. The lock hooks are held in the locked position by the springs.

a. Cleaning. Clean down lock mechanism with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. (1) Inspect down lock mechanism for cracks, dents, and distortion.

(2) Inspect bolts for evidence of wear and distortion.

(3) Inspect for cracks using dye penetrant.

4-269. TORQUE KNEE ASSEMBLIES.

4-270. A torque knee assembly is installed on each shock absorber assembly of each main landing gear assembly. The torque knee assembly prevents the lower shock absorber from turning in the upper shock absorber and limits the travel of the lower shock absorber.

4-271. SIDE BRACE ASSEMBLIES.

4-272. A side brace assembly (5, figure 4-34) is located on the inboard side of each main landing gear assembly. Each side brace assembly is attached to the top brace assembly and bracket on the shock absorber assembly of each main landing gear assembly.

4-273. TOP BRACE ASSEMBLIES.

4-274. A top brace assembly (6, figure 4-34) is installed on the upper end of each shock absorber assembly. The top brace assembly is used to attach each main landing gear assembly to the structure of each main wheel well.

4-275. DRAG BRAKE SHOE ASSEMBLIES.

4-276. The drag brake shoe assemblies are installed on the wing structure in the main wheel wells of the main landing gear assemblies. The tires of the main wheel and tire assemblies come in contact with the drag brake shoes and stop the main wheel and tire assemblies from turning when the main landing gear assemblies are retracted. Each drag

brake shoe assembly consists of drag brake shoe and spring.

a. Removal. Remove bolts, washers, and nuts and remove each drag brake shoe and spring from bracket in main wheel well for each main landing gear assembly.

b. Cleaning. Clean drag brake shoe assemblies with dry cleaning solvent (item 6, table 1-8) and allow to air dry.

c. Inspection. (1) Inspect drag brake shoes for worn, frayed, or loose cover.

(2) Inspect springs, for cracks, bends, and tension.

d. Installation. Position spring and drag brake shoe on bracket in main wheel well of each main landing gear assembly and secure with bolts, washers, and nuts.

4-277. NOSE LANDING GEAR ASSEMBLY.

4-278. The nose landing gear assembly (figure 4-37) is mounted on the nose structure of the fuselage and is retracted to the rear. The nose landing gear assembly consists of the nose wheel and tire assembly, torque knee assembly, shimmy damper, drag brace assembly, down lock mechanism, shock absorber assembly, and nose wheel steering mechanism. A drag brace shoe is installed in the nose wheel well to stop the nose wheel and tire assembly from turning after the nose landing gear assembly is retracted. On the U-8D, U-8G, and RU-8D aircraft, a nose wheel position indicator assembly is installed.

4-279. NOSE WHEEL AND TIRE ASSEMBLY.

4-280. The nose wheel and tire assembly (1, figure 4-37) is mounted on an axle on the lower end of the shock absorber assembly (2). The nose wheel and tire assembly consists of a tire, tube and wheel. Tapered cones and rollers are installed in the hub of the wheel.

a. Removal. (1) Jack nose of aircraft in accordance with paragraph 1-93.

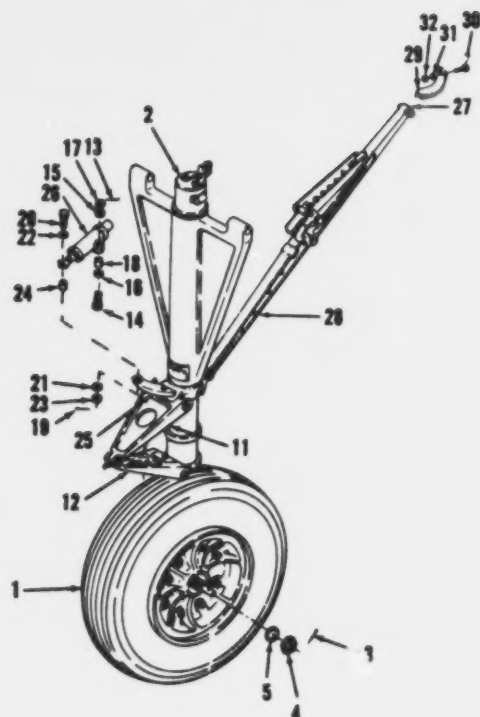
(2) Remove valve core from valve stem of tube and deflate tube.

(3) Remove cotter pin (3, figure 4-37), nut (4), and spacer (5) securing nose wheel and tire assembly and remove cones and rollers.

b. Cleaning. (1) Clean all metal parts of nose wheel with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

(2) Clean tire with a mild solution of soap (item 23 table 1-8) and water. Rinse in clean water and allow to air dry.

c. Inspection. (1) Inspect wheel for



corrosion, cracks, dents and out-of-round condition.

(2) Inspect cups, cones and rollers in accordance with TM 55-1510-204-25/1, Chapter 3, section 2.

(3) Ensure cones and rollers seat properly on axle and in both sides of wheel hub.

(4) Inspect tire for cracks, cuts, breaks, worn spots, and embedded foreign objects.

d. Installation. (1) Install valve core in valve stem and inflate tire and tube in accordance with paragraph 1-142.

(2) Pack cones and rollers with grease (item 62, table 1-8).

NOTE

When aircraft is to be operated in extremely low temperatures, pack cones and rollers with grease (item 50, table 1-8).

(3) Lightly coat axle, wheel hub interior, and cups with grease (item 62, table 1-8).

(4) Position cones and rollers in both sides of wheel hubs and position nose wheel and tire assembly (1, figure 4-37) on axle.

(5) Install spacer (5) and nut (4). Tighten nut enough to eliminate all side play, properly seat cones and rollers, and produce a wheel drag.

(6) Back off nut (4) just enough to allow nose wheel and tire assembly (1) to turn freely and install cotter pin (3).

(7) Lower jack and remove from aircraft.

4-281. DELETED.

4-282. DELETED.

4-283. TORQUE KNEE ASSEMBLY.

4-284. The torque knee assembly for the nose landing gear assembly is mounted on the forward side of the shock absorber assembly (2, figure 4-37). The upper torque knee (11) is attached to the upper shock absorber, and the lower torque knee (12) is attached to the lower shock absorber. The torque knee assembly prevents the lower shock absorber from rotating in the upper shock absorber and limits the travel of the lower shock absorber.

- | | |
|---------------------------------|-----------------------|
| 1. Nose wheel and tire assembly | 17. Nut |
| 2. Shock absorber assembly | 18. Bushing |
| 3. Cotter pin | 19. Cotter pin |
| 4. Nut | 20. Bolt |
| 5. Spacer | 21. Washer |
| 6. Deleted | 22. Washer |
| 7. Deleted | 23. Nut |
| 8. Deleted | 24. Bushing |
| 9. Deleted | 25. Shimmy damper arm |
| 10. Deleted | 26. Shimmy damper |
| 11. Upper torque knee | 27. Upper arm |
| 12. Lower torque knee | 28. Lower arm |
| 13. Cotter pin | 29. Drag brake shoe |
| 14. Bolt | 30. Bolt |
| 15. Washer | 31. Washer |
| 16. Washer | 32. Nut |

Figure 4-37. Nose landing gear assembly

4-285. SHIMMY DAMPER.

4-286: A shimmy damper (26, figure 4-37) is installed on the shock absorber assembly (2) of the nose landing gear assembly. The shimmy damper is the piston type, filled with hydraulic fluid. Any shimmy of the nose wheel assembly (1) is dampened by the forced flow of hydraulic fluid through the small orifices in the shimmy damper.

a. Removal. (1) Remove cotter pin (13, figure 4-37), bolt (14), washers (15 and 16), nut (17), and bushing (18) securing shimmy damper (26) to shock absorber assembly (2).

(2) Remove cotter pin (19), bolt (20), washers (21 and 22), nut (23), and bushing (24) securing forward end of shimmy damper (26) to shimmy damper arm (25). Remove shimmy damper.

b. Cleaning. Clean shimmy damper with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect shimmy damper for dents, nicks, cracks, and distortion, especially at pivot points, bushing bosses, and flanges.

d. Installation. (1) Position forward end of shimmy damper (26, figure 4-37) on shimmy damper arm (25) and install bushing (24), bolt (20), washers (21 and 22), nut (23), and cotter pin (19).

(2) Position shimmy damper (26) on shock absorber assembly (2) and install bushing (18), bolt (14), washers (15 and 16), nut (17), and cotter pin (13).

NOTE

Assure excessive vertical play does not exist at shock strut mount point.

(2A) Remove excessive play by adding washers as required.

(3) Service shimmy damper (26) in accordance with paragraph 1-139.

4-287. DRAG BRACE ASSEMBLY.

4-288. The drag brace assembly for the nose landing gear assembly is attached to the aft side of the shock absorber assembly (2, figure 4-37) and the structure in the nose wheel well. The drag brace assembly consists of upper and lower arms (27 and 28). The down lock mechanism is installed on the upper arm.

4-289. DOWN LOCK MECHANISM.

4-290. The down lock mechanism is installed on the drag brace assembly of the nose landing gear assembly. The down lock mechanism consists of two lock hooks, a link, two springs, and a lock pin. When the nose landing gear assembly is fully extended, the down lock mechanism lock the upper and lower arms together. The lock hooks are held in the locked position by the springs.

4-291. SHOCK ABSORBER ASSEMBLY.

4-292. The shock absorber assembly (2, figure 4-37) of the nose landing gear assembly is the air and hydraulic fluid type. The shock absorber assembly consists of an upper and lower shock absorber. The upper shock absorber has a rebound control that controls the flow of hydraulic fluid between the upper and lower shock absorbers. The lower shock absorber has an axle installed for mounting the nose wheel and tire assembly. A torque knee assembly is connected to the upper and lower shock absorbers to prevent the lower shock absorber from turning in the upper shock absorber.

4-293. NOSE WHEEL STEERING MECHANISM.

4-294. The nose wheel steering mechanism consists of link assemblies (2 and 15, figure 4-38), idler assembly (5), link (31), connecting link (36), bracket (32), and eye assembly consisting of yoke (26) and eye (27). The nose wheel steering mechanism is operated by the rudder pedals of the rudder control system. The link assembly (2) is spring-loaded to absorb steering shocks which would be transmitted to the rudder pedals. An automatic centering device assures proper nose wheel and tire assembly alignment for retraction of the nose landing gear assembly.

a. Removal. (1) Remove nose cone or radome. (Refer to paragraph 4-13 or 4-15.)

(2) Turn nose wheel and tire assembly to full left position.

(3) Remove bolt (1, figure 4-38), washers (28 and 37), and nut (29) connecting link assembly (2) and eye (27) to connecting link (36).

(4) Remove bolt (9), washer (3), and nut (4) and remove link assembly (2) from nose wheel well.

(5) Remove cotter pin (22), bolt (25), washers (24), and nut (23) and remove yoke (26) and eye (27) as an assembly.

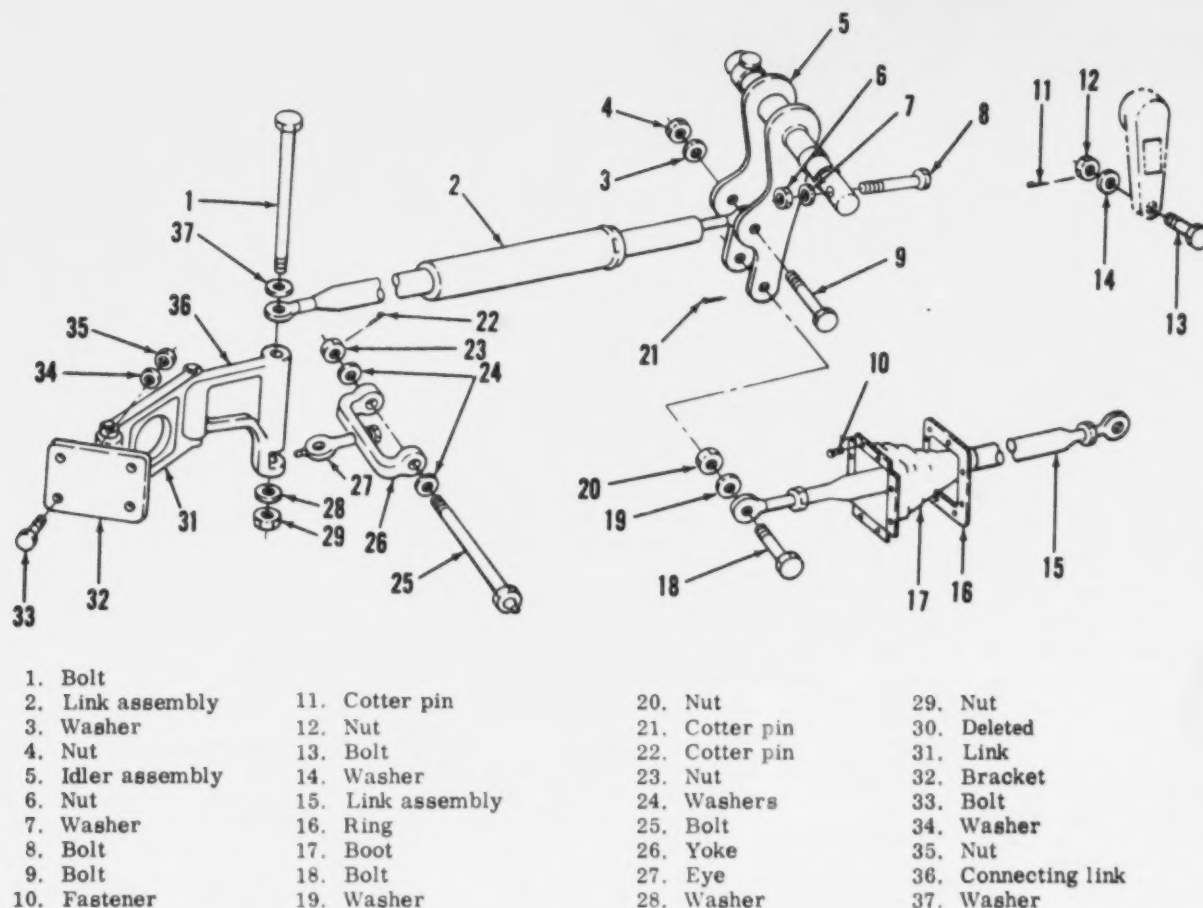


Figure 4-38. Nose wheel steering mechanism

(6) Remove bolts (33), washers (34), and nuts (35) and remove link (31), bracket (32), and connecting link (36) as an assembly.

(7) Remove carpeting and floorboard (or floor web) as required at pilot's rudder pedals to gain access to aft end of link assembly (15).

(8) Remove cotter pin (11), bolt (13), washer (14), and nut (12) connecting aft end of link assembly (15) to arm on rudder pedal torque tube.

(9) Remove cotter pin (21), bolt (18), washer (19), and nut (20) connecting forward end of link assembly (15) to arms of idler assembly (5).

(10) Unfasten boot (17) from link assembly (15). Pull link assembly forward and remove from boot.

(11) Remove fasteners (10) and ring (16) and remove boot (17) from structure in nose wheel well.

(12) Remove access cover on left side of nose wheel well and remove bolt (8), washer (7), and

nut (6). Remove idler assembly (5) from structure of nose wheel well.

b. Cleaning. Clean nose wheel steering mechanism with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect nose wheel steering mechanism for cracks, nicks, and distortion, especially at pivot points.

d. Installation. (1) Position idler assembly (5, figure 4-38) on structure of nose wheel well and install bolt (8), washer (7), and nut (6).

(2) Position boot (17) and ring (16) on structure of nose wheel well and secure with fasteners (10).

(3) Position link assembly (15) in boot (17) and fasten boot to link assembly.

(4) Connect aft end of link assembly (15) to arm on rudder pedal torque tube with bolt (13), washer (14), nut (12), and cotter pin (11).

(5) Connect forward end of link assembly (15)

to arms of idler assembly (5) with bolt (18), washer (19), nut (20), and cotter pin (21).

(6) Position bracket (32), with link (31) and connecting link (36) attached, on forward structure of nose wheel well. Secure bracket in position with bolts (33), washers (34), and nuts (35).

(7) Position aft end of link assembly (2) on arms of idler assembly (5) and install bolt (9), washer (3), and nut (4).

(8) Position forward end of link assembly (2) and eye (27), with yoke (26) attached on connecting link (36). Install bolt (1), washers (28 and 37), nut (29).

(9) Position yoke (26) on fitting at top of shock absorber assembly and install bolt (25), washers (24), nut (23), and cotter pin (22).

(10) Check nose wheel steering mechanism for proper operation.

(11) Install access cover on left side of nose wheel well.

(12) Install floorboard (or floor web) and carpeting.

(13) Install nose cone or radome. (Refer to paragraph 4-13 or 4-15.)

4-295. DRAG BRAKE SHOE.

4-296. The drag shoe (29, figure 4-37) for the nose wheel and tire assembly is located in the nose wheel well and attached to the structure of the fuselage. The drag brake shoe stops the nose wheel and tire assembly from turning when the nose landing gear assembly is retracted.

a. Removal. Remove bolts (30, figure 4-37), washers (31), and nuts (32) and remove drag brake shoe (29) from structure in nose wheel well.

b. Cleaning. Clean drag brake shoe with dry cleaning solvent (item 6, table 1-8) and allow to air dry.

c. Inspection. Inspect drag brake shoe for wear, cracks, nicks, and distortion.

d. Installation. Position drag brake shoe (29, figure 4-37) on structure in nose wheel well and secure with bolts (30), washers (31), and nuts (32).

4-297. NOSE WHEEL POSITION INDICATOR ASSEMBLY. (U-8D, U-8G, RU-8D)

4-298. The nose wheel position indicator assembly provides a mechanical indication as to the position of the nose landing gear assembly. The nose wheel position indicator assembly consists of a rod assembly (18, figure 4-39), plate (8),

indicator (6), link (15), idler assembly (19), and rod assembly (22). The indicator is located between the copilot's rudder pedals.

a. Removal. (1) Remove carpeting and floorboard from around plate (8, figure 4-39).

(2) Remove cotter pin (4), pin (7), washer (5), and bushings (3) attaching indicator (6) to link (15). Remove indicator.

(3) Disconnect wires from lights in plate (8). Remove nuts (9) from lights and remove plate with lights from bracket (12).

(4) Remove cotter pin (10) and washer (11) and remove aft end of rod assembly (18) from link (15).

(5) Remove screw (13), bushing (14), washer (16), and nut (17) securing link (15) to bracket (12) and remove link.

(6) Remove studs attaching boot (1) and ring (2) to structure of nose wheel well.

(7) Remove cotter pin (27) and washer (28) securing forward end of rod assembly (18) in idler assembly (19). Remove rod assembly (18), boot (1), and ring (2), as an assembly, from nose wheel well.

(8) Remove clamps securing boot (1) on rod assembly (18) and remove boot and ring (2).

(9) Remove cotter pin (26) and washer (25) securing end of rod assembly (22) in idler assembly (19). Remove end of rod assembly from idler assembly.

(10) Remove cotter pin (23) and washer (24) securing end of rod assembly (22) in bracket of nose gear door. Remove rod assembly from nose wheel well.

(11) Remove cotter pin (20), pin (29), and washer (21) and remove idler assembly (19) from structure of nose wheel well.

b. Cleaning. Clean nose wheel position indicator assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect nose wheel position indicator assembly for cracks, nicks, and distortion, especially at pivot points.

d. Installation. (1) Position idler assembly (19, figure 4-39) in structure of nose wheel well and install pin (29), washer (21), and cotter pin (20).

(2) Position end of rod assembly (22) in long arm of idler assembly (19) and secure with washer (25) and cotter pin (26).

(3) Position other end of rod assembly (22) in bracket of nose gear door and secure with washer (24) and cotter pin (23).

(4) Position boot (1) and ring (2) on rod assembly (18) and secure boot on rod assembly with clamps.

(5) Position rod assembly (18) in structure of nose wheel well and forward end of rod

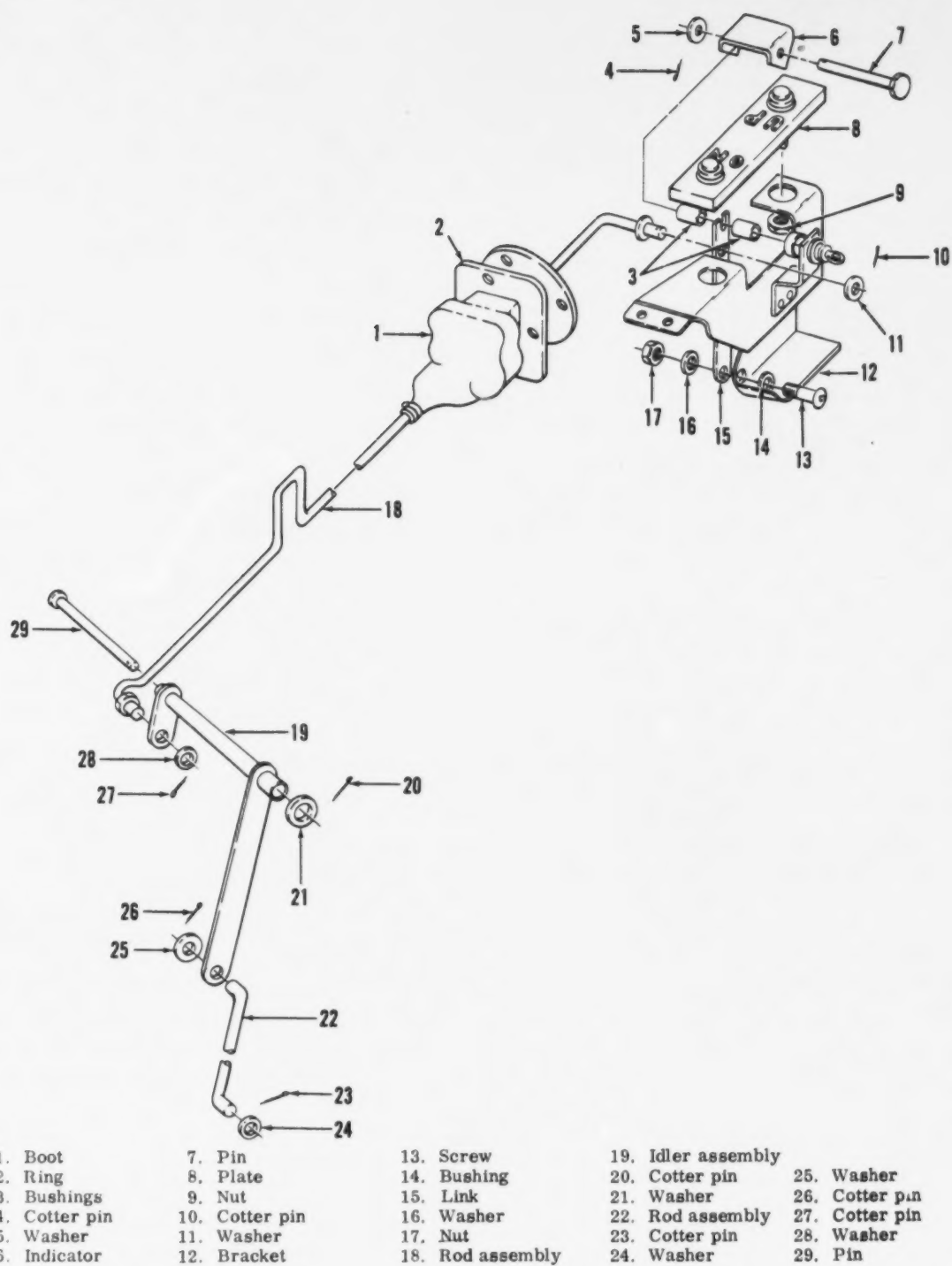


Figure 4-39. Nose wheel position indicator system (U-8D, U-8G, and RU-8D)

assembly on idler assembly (19). Secure end of rod assembly with washer (28) and cotter pin (72).

(6) Position boot (1) and ring (2) on structure of nose wheel well and secure with studs.

(7) Position link (15) and bushing (14) on bracket (12) and secure with screw (13) washer (16), and nut (17).

(8) Position aft end of rod assembly (18) in link (15) and secure with washer (11) and cotter pin (10).

(9) Position plate (8) on bracket (12) and install nuts (9) on lights in plate. Connect wires to each light.

(10) Position indicator (6) on plate (8) and a bushing (3) on each side of link (15). Install pin (7) through left side of indicator, bushings, and link. Secure pin in position with washer (5) and cotter pin (4).

(11) Install floorboard and carpeting.

(12) Adjust length of rod assembly (18) by bending the adjustment loop of rod assembly until indicator (6) covers the UP on plate (8) when nose landing gear assembly is extended.

4-299. LANDING GEAR RETRACTION SYSTEM. (U-8D, U-8G, RU-8D)

4-300. The landing gear retraction system consists of an electric motor, gear box and clutch assembly, torque tube assemblies, main gear actuators, nose gear actuator, one chain (U-8D, U-8G, and RU-8D) or two chains (U-8F), and sprockets. The landing gear retraction system is operated by the landing gear handle on the subpanel in the flight compartment.

4-301. GEAR BOX AND CLUTCH ASSEMBLY. (U-8D, U-8G, RU-8D)

4-302. The gear box and clutch are located below the floorboard of the copilot's and forward passenger's seats. The gear box and clutch are removed as an assembly. The motor that operates the landing gear retraction system is mounted on the gear box. The clutch protects the landing gear retraction system from overloads and absorbs the shock of starting and topping.

a. Cleaning. Clean gear box and clutch assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. Inspect gear box and clutch assembly for cracks, dents, and distortion.

4-303. GEAR BOX AND CLUTCH ASSEMBLY. (U-8F)

4-304. The gear box and clutch are located below the floor web assembly of the forward passenger's seats in the cabin. The gear box and clutch are removed as an assembly. The motor that operates the landing gear retraction system is mounted on the gear box. The clutch protects the landing gear retraction system from overloads and absorbs the shock of starting and stopping.

a. Cleaning. Clean gear box and clutch assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. Inspect gear box and clutch assembly for cracks, dents, and distortion.

4-305. TORQUE TUBE ASSEMBLIES.

4-306. The torque tube assemblies are located in the center wing. Each torque tube assembly extends from cross shaft at wing root to main gear actuator in main wheel well. Each torque tube assembly consists of two tubes, connected in the middle with a sleeve, and two universal joints.

a. Cleaning. Clean torque tube assemblies with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. Inspect torque tube assemblies for cracks, dents, burrs, and corrosion.

4-307. MAIN GEAR ACTUATORS.

4-308. The main gear actuators are located in the main wheel wells. The upper ends of the main gear actuators are mounted on the wing structure, and the clevis ends are connected to the upper arms of the drag brace assemblies. A spring is installed on the clevis end of each main gear actuator to serve as a shock absorber and prevent strain on component parts in the event the main gear actuators do not bottom at same instant.

a. Cleaning. Clean main gear actuators and supports with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. (1) Inspect main gear actuators for cracks, dents, and distortion.

(2) Inspect actuator supports for cracks in accordance with TM 55-1500-204-25/1 using dye penetrant method.

4-309. NOSE GEAR ACTUATOR.

4-310. The nose gear actuator is located in the nose wheel well. The upper end of the nose gear actuator is connected to the structure in the nose wheel well, and the clevis at the lower end is connected to a fitting on the upper arm of the drag brace assembly.

a. Cleaning. Clean nose gear actuator and actuator supports with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. (1) Inspect nose gear actuator for cracks, dents, and distortion.

(2) Inspect actuator supports for cracks in accordance with TM 55-1500-204-25/1, using dye penetrant method.

4-311. CHAIN AND SPROCKETS. (U-8D, U-8G, RU-8D)

4-312. The chain that drives the nose gear actuator is a double-type chain approximately 17 feet 9 inches long. The chain runs forward from a drive sprocket on the cross shaft to a sprocket at the nose gear actuator. Four sets of sprockets support the chain and maintain proper adjustment.

a. Cleaning. Clean chain and sprockets with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. (1) Inspect chain for bends, cracks, burrs, and corrosion.

(2) Inspect sprockets for cracks, burrs, worn teeth, and corrosion.

(3) Inspect actuator drive shaft for cracks, dents and corrosion.

4-313. CHAINS AND SPROCKETS. (U-8F)

4-314. The chains that drive nose gear actuator are the double-type chains. The longer chain is approximately 15 feet 5-1/2 inches long; the shorter chain is approximately 5 feet 2 inches long. The long chain is routed forward from the drive sprocket on the cross shaft and on sprockets to the sprocket on the end of transfer drive shaft. The short chain is routed forward from the sprocket on the left end of the transfer drive shaft and around adjustable sprockets, then up around sprocket on the right side of the nose gear actuator.

a. Cleaning. Clean chains, transfer drive shaft, and sprockets with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. (1) Inspect chains for bends, cracks, burrs, and corrosion.

(2) Inspect sprockets for cracks, burrs, worn teeth, and corrosion.

(3) Inspect transfer drive shaft for cracks, dents, and corrosion.

4-315. EMERGENCY EXTENSION SYSTEM. U-8D, U-8G, RU-8D)

4-316. The emergency extension system is used to manually extend the landing gear assemblies when they cannot be extended in the normal manner due to a power failure or component malfunction. The emergency extension system is operated by an extension handle and clutch disengage lever. The clutch disengage lever simultaneously disengages the gear box and clutch assembly of the landing gear retraction system from the cross shaft and engages clutch of the emergency extension system. The emergency extension system will not retract the landing gear assemblies.

a. Cleaning. Clean components of emergency extension system with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. Inspect components of emergency extension system for cracks, dents, distortion, and elongated pivot points.

4-317. EMERGENCY EXTENSION SYSTEM. (U-8F)

4-318. The emergency extension system is used to manually extend the landing gear assemblies when they cannot be extended in the normal manner due to a power failure or component malfunction. The emergency extension system is operated by an extension handle and clutch disengage lever. The clutch disengage lever simultaneously disengages the gear box and clutch assembly of the landing gear retraction system from the cross shaft and engages the clutch of the emergency extension system. The emergency extension system will not retract the landing gear assemblies.

a. Cleaning. Clean components of emergency extension system with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. Inspect components of emergency extension system for cracks, dents, distortion, and elongated pivot points.

4-319. LANDING GEAR DOOR ASSEMBLIES.

4-320. The landing gear door assemblies are the clamshell type which open as the landing gear assemblies are extended and close as the landing gear assemblies are retracted. On the U-8F aircraft, the nose wheel and tire assembly is completely enclosed by the nose gear door assemblies, and the main wheel and tire assemblies protrude out through slots in the main gear door assemblies. On the U-8D, U-8G, and RU-8D aircraft, the nose and main wheel and tire assemblies protrude out through slots in the nose and main gear door assemblies. The purpose of the wheel and tire assemblies protruding through the gear door assemblies is for landing when the landing gear assemblies will not extend.

4-321. MAIN GEAR DOOR ASSEMBLIES AND LINKAGE.

4-322. The main gear door assemblies are attached to the structure of the center wing on each side of each main wheel well. Each main gear door assembly is connected by a turnbuckle to the linkage that opens and closes the main gear door assemblies when the main landing gear assemblies are extended or retracted.

a. Cleaning. (1) Clean main gear door assemblies in accordance with paragraph 1-159.

(2) Clean linkage with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. (1) Inspect main gear door assemblies for cracks, dents, holes, and loose or missing rivets.

(2) Inspect linkage for binds, cracks, dents, and corrosion.

4-323. NOSE GEAR DOOR ASSEMBLIES AND LINKAGE.

4-324. The nose gear door assemblies are the clam-shell type and are attached by hinges to the structure of the fuselage on each side of the nose wheel well. Each nose gear door assembly is connected by a rod assembly to a bracket on each side of the upper arm of the drag brace assembly.

a. Cleaning. (1) Clean nose gear door assemblies in accordance with paragraph 1-159.

(2) Clean linkage with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

b. Inspection. (1) Inspect nose gear door assemblies for cracks, dents, holes, and loose or missing rivets.

(2) Inspect linkage for cracks, bends, dents, and elongated pivot points.

CHAPTER 5

POWER PLANT AND RELATED SYSTEMS

SECTION I SCOPE

5-1. PURPOSE.

5-2. The purpose of this chapter is to provide all the essential information for maintenance personnel to accomplish organizational maintenance on the complete power plant and related systems as prescribed by the Maintenance Allocation Chart.

5-3. DESCRIPTION.

5-4. The information contained in this chapter provides the necessary instructions for the operation, troubleshooting, removal, permissible repair, conditioning, testing, and installation of component parts of the power plant, accessories, and related systems. The following

warning covers a standard procedure to be carried out before removing or installing any unit on the power plant to which electrical wiring or components are connected.

WARNING

Before removal or installation of electrical wiring or components, ensure that ignition switches are off. Disconnect battery and any external power, then open applicable circuit breakers. If units removed are not immediately replaced, ensure that all connector ends are capped and stowed, and all loose cable ends are properly insulated and stowed in a manner to avoid possibility of shorting should power be accidentally reinstated.

SECTION II POWER PLANT

5-5. POWER PLANT.

5-6. The 0-480-1, -1A, and -1B engines are used in the U-8D, U-8G, and RU-8D aircraft. The 0-480-1 engine has four ring pistons, the 0-480-1A has five ring pistons, and the 0-480-1B has repositioned crankshaft counter weights and three ring pistons. The 0-480-3 and -3A engines are used in the U-8F aircraft. The 0-480-3 engines has five ring pistons and the -3A engine has repositioned crankshaft counter weights and three ring pistons. The 0-480-1, -1A, and -1B engines

utilize a pressure injection carburetor and the 0-480-3 and -3A engines use a fuel injection system. Troubleshooting procedures for the power plant are as follows.

NOTE

Use of engine ignition analyzers is required for diagnostic and maintenance purposes. For operation, refer to manual provided with engine ignition analyzer.

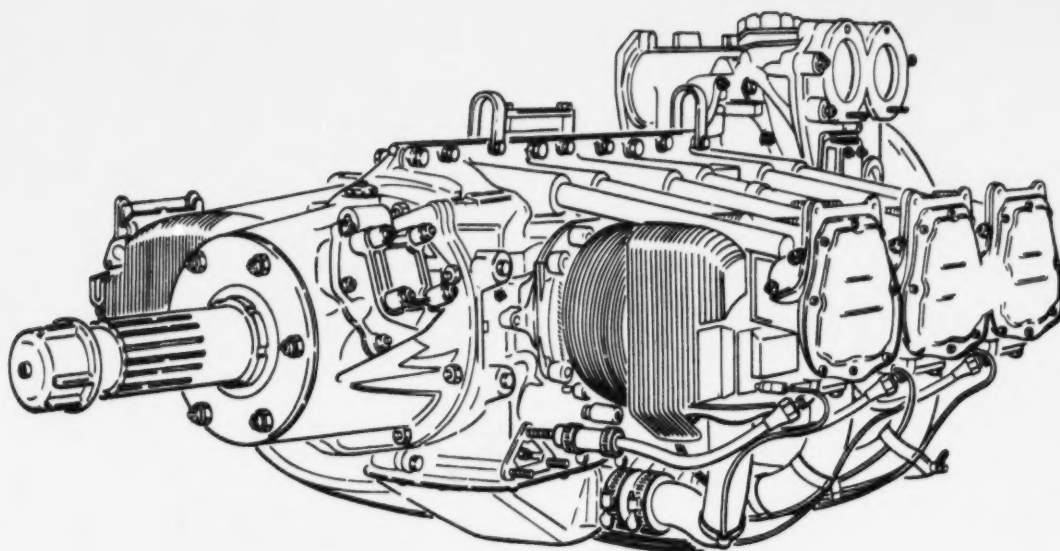


Figure 5-1. Typical O-480 Lycoming engine

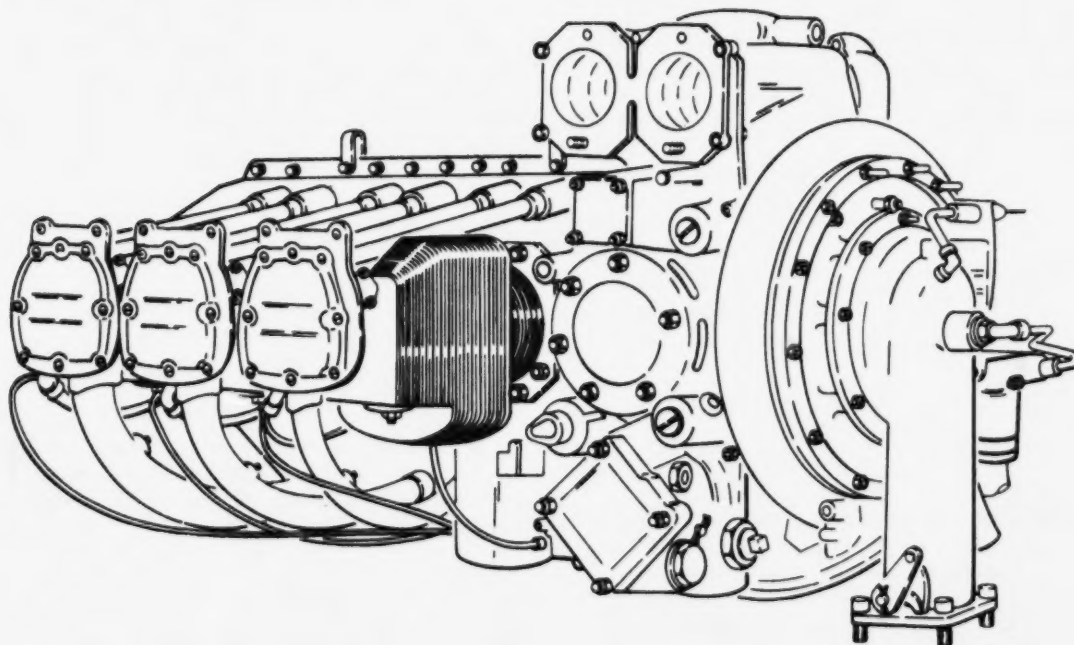


Figure 5-2. Left rear view of O-480-3 Lycoming engine

INDICATION OF TROUBLE	PROBABLE CAUSE	REMEDY
Engine fails to start.	Lack of fuel.	Check fuel system for leaks. Service fuel tanks. (Refer to paragraph 1-123.) Clean fuel lines or fuel strainer. (Refer to paragraph 5-106.)
	Underpriming.	Prime as necessary.
	Overpriming.	Turn ignition switch off. Open throttle and turn propeller over several revolutions with starter.
	Incorrect throttle setting.	Open throttle one-tenth of its range.
	Defective spark plugs.	Replace spark plugs. (Refer to paragraph 5-168.)
	Defective ignition wire.	Test ignition system. (Refer to paragraph 5-165.)
	Insufficient clearance of breaker points.	Check internal timing of magneto. (Refer to paragraph 5-159.)
	Defective battery.	Replace battery. (Refer to paragraph 12-167 or 12-177.)
	Low fuel pressure.	Check fuel strainer.
	Water in carburetor (U-8D, U-8G, and RU-8D).	Drain carburetor and fuel lines.
	Internal failure.	Check scavenge pump oil screen for metal particles. If metal particles are found, notify direct support maintenance unit.
Engine fails to idle properly.	Incorrect idle speed adjustment (U-8D, U-8G, and RU-8D).	Adjust idle speed. (Refer to paragraph 5-176.)
	Leaking carburetor regulator (Poppet) valve (U-8D, U-8G, and RU-8D).	Flush carburetor regulator (Poppet) valve. (Refer to paragraph 5-176.)
	Leaking carburetor discharge nozzle (U-8D, U-8G, and RU-8D).	Replace carburetor. (Refer to paragraph 5-176.)
	Low fuel pressure.	Check fuel strainer and adjust engine-driven fuel pump. (Refer to paragraph 5-112.)
	Incorrect idle mixture adjustment.	Adjust idle mixture adjustment. (Refer to paragraph 5-176.)
	Defective fuel injector pump (U-8F).	Replace fuel injector pump. (Refer to paragraph 5-180.)

INDICATION OF TROUBLE	PROBABLE CAUSE	REMEDY
Engine has low power and runs unevenly.	Defective fuel injector nozzle (U-8F).	Replace fuel injector nozzle. (Refer to paragraph 5-182.)
	Defective auto-rich solenoid (U-8F).	Replace auto-rich solenoid. (Refer to paragraph 5-184.)
	Leak in air induction system.	Tighten all connections in air induction system. Replace any parts that are defective.
	Low cylinder compression.	Check cylinder compression. (Refer to paragraph 5-32.)
	Faulty ignition system.	Test ignition system. (Refer to paragraph 5-165.)
	Mixture too rich; indicated by sluggish engine operation or red exhaust flame at night. Extreme cases indicated by black smoke from exhaust (U-8D, U-8G, and RU-8D).	Adjust mixture. Notify direct support maintenance unit.
	Mixture too lean; indicated by overheating or backfiring (U-8D, U-8G, and RU-8D).	Adjust mixture. Notify direct support maintenance unit.
	Leaking fuel injector nozzle (U-8F).	Remove fuel injector nozzle and blow into it. Air escaping through nozzle valve indicates leakage. Replace fuel injector nozzle. (Refer to paragraph 5-182.)
	Restricted oil supply or low oil pressure to fuel injector pump (U-8F).	Check for restrictions in oil lines. Adjust fuel injector pump. Notify direct support maintenance unit.
	Adjustment of fuel injector pump incorrect (U-8F).	Adjust fuel injector pump. Notify direct support maintenance unit.
	Broken capillary tube or temperature bulb (U-8F).	Replace fuel injector pump. (Refer to paragraph 5-180.)
	Fuel supply pressure excessively high.	Adjust engine-driven fuel pump. (Refer to paragraph 5-112.)
	Leak in manifold pressure line.	Tighten connection or replace manifold pressure line.
	Ice in servo-oil (Extreme cold weather.)	Heat pump.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Engine fails to develop full power.	Leaks in air induction system.	Tighten all connections. Replace defective parts. Check supercharger drain valve for proper operation.
	Defective spark plugs.	Replace spark plugs. (Refer to paragraph 5-168.)
	Improper grade of fuel.	Service fuel tanks with recommended grade of fuel. (Refer to paragraph 1-123.)
	Magneto breaker points dirty.	Clean magneto breaker points. (Refer to paragraph 5-163.)
	Defective ignition wires.	Test ignition wires. Replace defective wires. (Refer to paragraph 5-165.)
	Improper ignition timing.	Check magnetos for timing and and synchronization. (Refer to paragraph 5-159.)
	Defective spark plug lead connectors.	Replace spark plug lead connectors.
	Throttle controls out of adjustment.	Adjust throttle controls. (Refer to paragraph 5-194 or 5-202.)
	Leak in air induction system.	Tighten all connections. Replace defective parts.
	Improper fuel pressure.	Check fuel strainer and adjust engine-driven fuel pump.
	Restricted oil supply or sticking Z shaft (U-8F).	Replace fuel injector pump. (Refer to paragraph 5-180.)
	Restriction in air scoop.	Examine air scoop and remove restriction.
	Improper grade of fuel.	Service fuel tanks with recommended grade of fuel. (Refer to paragraph 1-123.)
	Faulty ignition.	Tighten all connections. Test ignition system. Check timing of magnetos. (Refer to paragraph 5-159 and 5-165.)
Engine vibrates	Cracked, loose, or misaligned engine mount.	Repair or replace engine mount. Notify direct support maintenance unit.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Low oil pressure.	Unbalanced propeller.	Check propeller for balance. Notify direct support maintenance unit.
	Defective sandwich mount bushings.	Replace sandwich mount bushings. Notify direct support maintenance unit.
	Low oil supply.	Service oil tank. (Refer to paragraph 1-130.)
	Leak in oil return or pressure line.	Replace line.
	Leak at accessory housing and crankcase gasket.	Notify direct support maintenance unit.
	Dirty oil filter.	Replace oil filter. (Refer to paragraph 5-144.)
	Air lock or dirt in oil pressure relief valve.	Remove and clean oil pressure relief valve.
	High oil temperature.	Refer to high oil temperature in INDICATION OF TROUBLE column.
	Defective oil pressure gage.	Replace engine gage unit. (Refer to paragraph 10-41.)
	Stoppage in oil pump intake passage.	Check line for obstruction.
High oil temperature.	Failing or failed bearings.	Check oil sump for metal particles. If metal particles are found, notify direct support maintenance unit.
	Insufficient oil cooling.	Check air inlet and outlet for deformation and obstruction.
	Low oil supply.	Service oil tank. (Refer to paragraph 1-130.)
	Improper grade of oil.	Service oil tank with recommended grade of oil. (Refer to paragraph 1-130.)
	Clogged oil lines or dirty oil filter.	Remove obstruction in oil lines. Clean oil filter. (Refer to paragraphs 5-285 through 5-289.)
	Excessive Blow-by	Accomplish compression test. (Refer to paragraph 5-32.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive oil consumption.	Defective oil temperature gage.	Replace engine gage unit. (Refer to paragraph 10-41.)
	Failing or failed bearings.	Check oil filter for metal particles. If metal particles are found, notify direct support maintenance unit.
	Improper grade of oil.	Service oil tank with recommended grade of oil. (Refer to paragraph 1-130.)
	Failing or failed bearings.	Check oil filter for metal particles. If metal particles are found, notify direct support maintenance unit.
	Worn piston rings.	Replace cylinder. Notify direct support maintenance unit.
Cold weather difficulties.	Cold oil.	Heat oil or move aircraft into heated hangar.
	Inaccurate oil pressure readings.	In extreme cold weather, oil pressure readings of approximately 100 psi do not necessarily indicate malfunctioning.
	Overpriming.	Turn ignition switch off. Place throttle lever full open and turn propeller over several revolutions with starter.
	Weak battery.	Replace battery. (Refer to paragraph 12-167 or 12-177.)
Engine fails to stop.	Mixture control does not permit full travel to IDLE CUTOFF position.	Adjust mixture controls. (Refer to paragraph 5-198.)
	Primer solenoid valve leaking internally.	Replace primer solenoid valve. (Refer to paragraph 5-116.)
	Leaking carburetor regulator (poppet) valve.	Flush carburetor regulator (poppet) valve. (Refer to paragraph 5-176.)
	Fuel injector solenoid leaking internally (U-8F).	Replace fuel injector solenoid. Refer to paragraph 5-186.)
	Faulty battery switch.	Replace battery switch. (Refer to paragraph 12-19.)
	Idle cutoff switch not operating (U-8F).	Check operation of fuel injector solenoid.

5-7. DIRECTIONAL REFERENCES.

5-8. All references to direction or to the position of the engine will be given as if the engine were mounted in the aircraft. The term rear shall refer to the accessory housing end of the engine. The terms right and left shall apply when the engine is viewed by an observer standing at the rear of the engine, i.e., facing the accessory housing end. Instead of being directly opposite each other, the cylinders are staggered, thus permitting a separate throw on the crankshaft for each connecting rod.

5-9. ENGINE ACCESSORIES AND ACCESSORY DRIVES.

5-10. All accessories are mounted on the sides of the accessory housing. All accessory drives are contained within the accessory housing. The accessory housing consists of two magnesium castings bolted together and secured to the rear of the crankcase. The rear of the accessory housing provides a mounting pad for the supercharger assembly. The accessories are secured to mounting pads by studs, washers, and nuts, and connected to their respective systems by necessary piping or cabling. During removal or installation of engine accessories, care must be taken to ensure that dirt or foreign material does not enter the accessory housing or accessories, and that the mating surfaces are clean and gaskets serviceable. Inspect the engine as follows:

- a. Inspect externally accessible accessory housing inserts and studs for broken and loose studs and inserts.

- b. Inspect accessory drive seals for evidence of leaks.

5-11. ENGINE LUBRICATION SYSTEM.

5-12. The engine lubrication system is of the full-pressure, dry-sump type. The oil pressure is provided by a gear-type oil pump incorporated in the engine. Accessory drive bearings, supercharger bearings, main bearings, connecting rod bearings, crankshaft front bushings, reduction gear pinion shafts, camshaft bearings, valve tappets, push rods, valve rocker arm bushings, governor drive, propeller shaft thrust bearings, and reduction gear teeth are lubricated by positive pressure. Pistons, piston pins, cams, cylinder walls, valve rockers, valve stems, and other parts are lubricated by spray and run-off from moving parts. The engine lubrication system is pressurized by a centrifugal-type oil

pump enclosed within the accessory housing. The oil pump incorporates a pressure pump and a scavenger pump driven by a common drive shaft. The pressure pump draws oil from a tank mounted separately from the engine, and forces the oil through an oil check valve to the oil pressure relief valve. (The oil check valve acts as a shutoff valve for gravity-fed oil when engine is not operating, thereby preventing oil from draining into the crankcase.) The oil pressure relief valve, which is adjustable, controls the engine oil pressure by discharging excess oil back to the inlet side of the oil pump. The remainder, or normal pressure oil, then flows through two separately drilled passages, one passage distributing pressure oil to accessory drive section and the other passage being the main oil supply passage which extends the full length of the crankcase, with auxiliary passages drilled to each main bearing. These passages align with holes in the main bearing journals and deliver oil to the interior of the crankshaft. Each connecting rod bearing receives pressure oil through passages drilled in the crankshaft. Pressure oil is delivered to the reduction gear from the front main bearing oil chamber in the crankshaft. The main oil gallery in the left crankcase half registers with a drilled hole in the reduction gear housing and supplies oil to the propeller governor drive. High pressure oil from the propeller governor is delivered to the interior of the propeller shaft by indexing holes suitably sealed to prevent leakage and a pressure drop. Oil from the main supply passage flows to two valve passages running the length of each half branch to hydraulic tappets and to camshaft bearings. Oil enters the hydraulic tappets through indexing holes and travels out to the valve mechanism through hollow push rods, lubricating the valve rocker bearings and valve stems. Oil drains from rocker boxes through the external drain tubes connecting the rocker boxes with the oil sump. Scavenge oil is collected in the oil sump, from which point drilled passages conduct oil back to the scavenge pump in the accessory housing, where oil is then discharged to the external oil tank. Pressure buildup within the crankcase is held to a minimum by means of a breather mounted on top of the accessory housing.

5-13. REASONS FOR ENGINE REMOVAL.

5-14. Paragraphs 5-15 through 5-31 outline the most common reasons for engine removal before termination of the recommended running time,

and include checks to assist in determining whether the engine may continue in service after minor repairs, or be removed by the assigned echelon and dispatched for overhaul. Except in cases of obvious failure, such as complete internal failure, or completion of recommended running time, engines should not be removed until an investigation has been made by a competent engine condition team. Engines may be removed when an aircraft is being transferred overseas, when an aircraft is undergoing reconditioning or major repair at depots, and at maximum engine running times. For overhaul and retirement data of the engine, refer to paragraph 3-14.

5-15. SUDDEN STOPPAGE OF ENGINE. Sudden stoppage is defined as a very rapid stoppage of the engine by one or more of the propeller blades hitting an object in such a manner that the engine rpm goes to zero and is not regained. When sudden stoppage occurs, internal damage, such as cracked gear teeth, crankshaft misalignment, damaged bearings, etc, may result. Notify direct support maintenance unit of engines having experienced sudden stoppage.

5-16. SUDDEN REDUCTION IN SPEED (PROPELLER STRIKING A SMALL MOVEABLE OBJECT). Sudden reduction in speed is defined as a rapid reduction in engine rpm when one or more of the propeller blades strikes a small movable object, such as a tool box, and the engine continues to run and recovers its former rpm. Engines reported to have encountered reduction in speed will be thoroughly inspected as follows:

a. Remove and inspect engine oil screens for presence of metal particles. Drain oil from the sump into a clean container and strain through a clean cloth to check for metal particles. If heavy metal particles are found, indicating a definite engine failure, engine removal is required. However if metal particles in the nature of fillings are found, continued inspection of the engine to determine its serviceability will be accomplished.

b. Check propeller shaft for misalignment.

NOTE

This cannot be done at the organizational maintenance level. Notify direct support maintenance unit.

c. Operate and check engine for smoothness of operation and power output. If engine operates properly during ground check it will be shut down and procedures outlined in step a above will be

repeated. If there is no indication of heavy metal particles in the engine, it will be given a 2-hour flight test. If engine operates properly during flight test, it will be checked again for metal particles in the oil system. If no further indication of metal particles is found after the flight test, engine will be considered serviceable however, oil filters will be rechecked for presence of metal particles after 10 hours of operation and after 20 hours of operation. If no indication of internal failure is found after 20 hours of operation the engine will require no further special inspections.

5-17. SUDDEN REDUCTION IN SPEED (PROPELLER STRIKING AN IMMOVABLE OBJECT). When an engine is operating and the propeller rpm is suddenly reduced by the propeller striking an immovable object, such as the ground, ramp, building or runway, engine removal is required. Notify direct support maintenance unit of the incident.

5-18. EMERGENCY PROCEDURE FOR ENGINES HAVING EXPERIENCED SUDDEN REDUCTION IN SPEED OR SUDDEN STOPPAGE. If the accident which caused the sudden slowing or stoppage occurs at an outlying field where a replacement engine or necessary checking equipment is not available, the aircraft will be grounded until proper action in accordance with paragraphs 5-15, 5-16, or 5-17 can be taken.

5-19. OIL CONSUMPTION. Oil consumption varies with engine power settings used. An oil consumption limit which is satisfactory for maximum cruising power, would be too high for low cruising power, or vice versa. In addition, one or more cylinders having high oil consumption could cause engine malfunction and still not be regarded as high engine oil consumption. Use the oil consumption chart (figure 5-3) to project allowable oil consumption.

5-20. FOREIGN MATERIAL IN OIL SYSTEM. The following is a guide to the analysis of engine indications and the evaluation of engine serviceability, the findings on engines at time of overhaul, and operating experience. This guide has been established on a conservative basis; therefore, it is consistent with the policy of not operating any engine of doubtful airworthiness. Sound decisions will require a careful analysis of the foreign material found, and careful inspection and analysis of each engine involved.

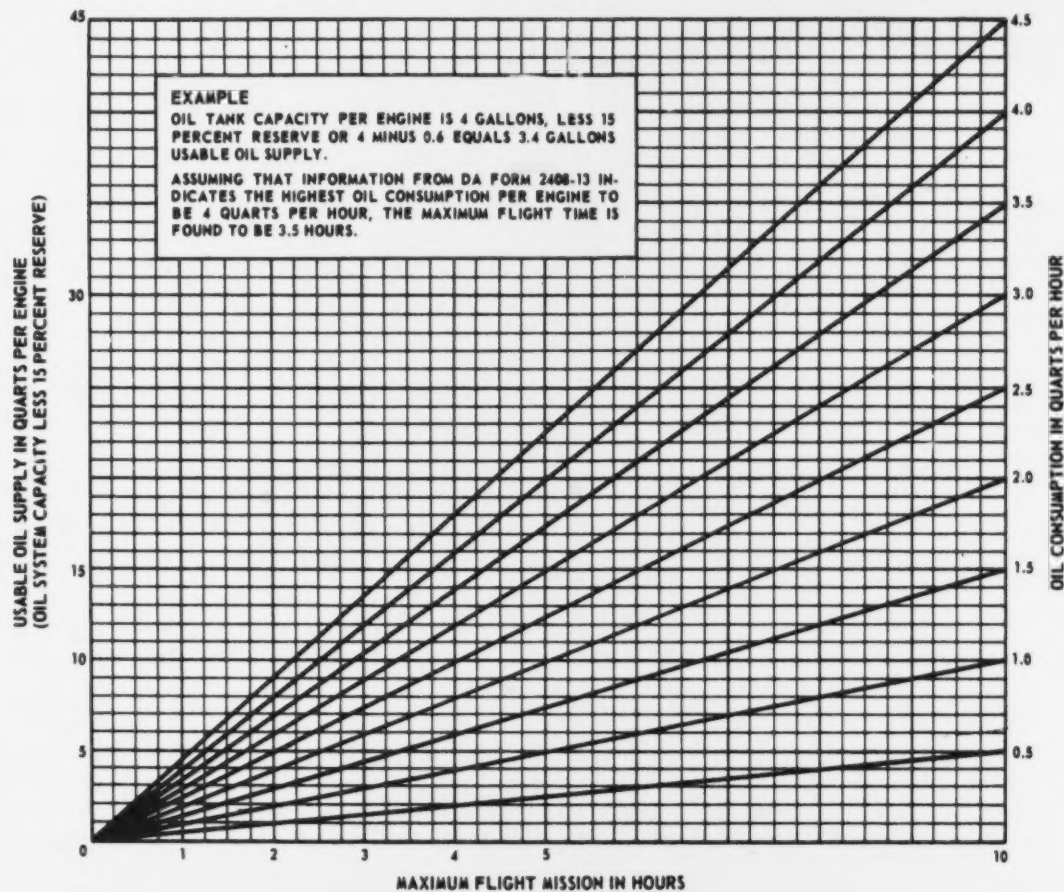


Figure 5-3. Oil consumption chart

a. Rubber-like Particles. Generally rubber-like particles found on engine oil filters are an indication of faulty oil line. The following procedures will be accomplished when oil filter or oil is found to have foreign material:

(1) Check aircraft DA Form 2408-13 for any writeups of high oil temperature that could not be lowered by normal methods.

(2) If oil temperature has been high and the oil filter was found to have foreign material, the engine will be removed. Notify direct support maintenance unit. All oil-fed accessories will be thoroughly inspected for foreign material, and flushed. Source of the material will be detected and corrected.

(3) If no indication of high oil temperature is found, oil system will be drained and refilled. (Refer to paragraph 1-130.) Operate engine for 15 minutes at field barometric pressure and

observe oil temperature for any indication of high temperature.

NOTE

Do not allow the oil temperature to exceed the temperatures specified in TM 55-1510-201-10.

(4) After engine is shut down, remove oil screen and check for any foreign material. If oil filter or oil is not contaminated, the engine will be considered serviceable.

b. Metal particles. Generally, metal particles on the engine oil screens are an indication of partial internal failure of the engine. However, due to the construction of aircraft oil systems, it is possible that metal particles may have collected in the sludge in the oil system at time

of a previous engine failure; consequently, this must be taken into account when metal particles are found in the engine oil filters. Fre-

quently, carbon tends to break loose from the interior of the engine in large pieces which have the outward appearance of metal. However,

carbon can be distinguished from metal by placing the foreign material on a flat metal object and hitting it with a hammer. If the material is carbon, it will disintegrate when struck with a hammer, whereas metal will either remain intact or change shape, depending on the malleability of the metal. Before removing an engine for suspected internal failure as indicated by foreign material on oil filters, collect all obtainable metal particles for analysis and samples. In order to save fine metal particles, it may be necessary to strain the oil through a cloth. The cloth and metal particles can be placed in a clean metal container and sent with the engine to overhaul.

CAUTION

An oil soaked rag can very easily cause spontaneous combustion unless placed in a tightly closed container such as a quart or pint can with press-fit lid.

5-21. DECONTAMINATION OF ENGINE OIL SYSTEM AND ACCESSORIES. In all cases of internal engine failure, decontamination of the oil system will be accomplished as follows:

- a. The oil system will be drained. When all excess oil has been removed, the complete oil system will be cleaned thoroughly with cleaning solution (item 90, table 1-8).
- b. All oil lines will be cleaned while installed, by circulating the cleaning solution under pressure through the lines. Oil lines that cannot be cleaned while installed will be removed and thoroughly cleaned utilizing the cleaning solution.
- c. Oil coolers will be removed and back flushed.
- d. Oil tanks will be removed and cleaned using oil system cleaning solution, and dried out using compressed air.
- e. The propeller governor will be disassembled and thoroughly cleaned using cleaning solution.
- f. Cleaning at the normal engine changes and at periodic inspection oil changes will be accomplished by draining the oil from the system and then thoroughly flushing and cleaning the system by forcing the oil system cleaning solution under pressure through the system. Removal of oil tanks will not be necessary. Cleaning at the periodic inspection oil changes will not require removal of the oil cooler; oil cooler will be cleaned while installed.

5-22. IN-SERVICE PARTS FAILURES. When pieces of a steel part which has failed, such as a piston ring, valve, valve spring, washer,

rocker arm, rocker arm bearing, etc., are found. An engine evaluation will be conducted to determine if metal particles were ingested into the engine. If metal particles are known or suspected to have entered the engine, the engine will be replaced.

5-23. LOW CYLINDER COMPRESSION. Low cylinder compression may cause removal of the engine, depending upon the number of cylinders affected and remaining useful engine life. Refer to paragraph 5-32 for cylinder compression test. Where it is more economical to remove engine from aircraft than to replace cylinders with the engine installed, the engine may be removed by the assigned maintenance level for cylinder changes and installed in another aircraft. Refer to TM 55-1500-204-25/1 for number of cylinders that may be removed.

5-24. BASIC MECHANICAL FAILURES. An engine should be removed when an internal or external portion of engine, such as a bos, casting threads, studs, etc., become cracked, nicked, broken, or damaged to the extent that repair cannot be made with engine installed. External failures on engine, cylinders, and accessories can be corrected by replacing the damaged assembly by the assigned maintenance level. However, many of these engines can be repaired. Most studs, helicoil inserts, accessory sections, and nose sections can be replaced or repaired by the assigned maintenance level and the engine continued in service. Time on the engine is a deciding factor.

NOTE

Whenever reduction gear lock ring gear circlip P/N 65973 and rivet P/N MS 20613-3P7 are found intact in the engine oil sump, remove items, replace reduction gear and continue engine in service.

5-25. ENGINE OVERSPEEDING. The red radial line on the tachometer represents the limit which should not be exceeded in operation of the engine. Any period of operation beyond these limits enhances the possibility of serious engine damage and eventual failure. Because of this, any overspeed should be carefully noted and entered on DA Forms 2408-13 and 2408-15 so that appropriate maintenance action may be taken to prevent the loss of an engine in flight. If engine RPM reaches 3510 to 3600 rpm, engine must be given a critical inspection to detect any possible latent damage that may have occurred; if 3600 rpm is exceeded, engine must

be removed as a safety precaution. Notify direct support maintenance unit.

5-26. ENGINE INSPECTION AFTER OVERSPEEDING. a. Inspect for cracked or broken cylinder heads and barrels.

b. If cylinder head is cracked, broken, or a peened piston head is found and no particles of piston or rings have entered power section of engine, remove cylinder and piston assembly. Notify direct support maintenance unit.

c. If connecting rods are satisfactory, replace cylinder and piston assembly with a serviceable cylinder and piston assembly. Notify direct support maintenance unit.

d. After replacement of a cylinder and piston assembly, engine will be kept in service as specified in paragraph 5-28.

5-27. OIL SYSTEM INSPECTION AFTER OVERSPEEDING. a. Remove oil filters and thoroughly inspect for metal particles.

b. Drain oil sump, using a clean cloth to catch any metal particles that may be present.

NOTE

Ensure that particles found are metal and not carbon. Refer to paragraph 5-20.

c. Should inspection disclose an abnormal amount of metal particles, engine removal is required. Notify direct support maintenance unit.

d. When no metal particles are found, engine will be operated in accordance with paragraph 5-28.

5-28. ENGINE OPERATION AFTER OVERSPEED/OVERBOOST INSPECTION. When inspection of engine discloses no visible damage as a result of overspeeding or overboost, the aircraft will be restricted to local flights and flown on a circled red X status for a period of 10 hours. An inspection of oil filters will be accomplished at end of the tenth hour, as prescribed in this section. Should inspections of oil filters disclose an abnormal amount of metal particles, the engine will be removed. However, if final inspection proves negative, the aircraft will be unconditionally released for normal flight operations. Should any subsequent inspections of oil filters performed at normal inspection periods disclose an abnormal amount of metal particles, the engine will be removed. In addition to the usual description of failure of engine, specific reference will be made to all known instances of overspeed and overpower operations with all pertinent information outlined in this section.

5-12

5-29. ENGINE OVERBOOST. Refer to applicable operator's manual (-10).

5-30. Spark Plug Copper Runout. If copper runout is noted, the cylinder from which the spark plug was removed will be replaced, as this indicates that temperature in the cylinder has exceeded 1083°C (1981°F). The engine will be inspected to locate the reason for excessive temperature, and the oil filters will be checked for metal particles. Engines found to have spark plug copper runout on more than 25 percent of the cylinders will be removed from service, as the engine has been subject to excessive heat that may cause engine failure. Notify direct support maintenance unit.

5-31. COLD CYLINDER CHECK. The cold cylinder check, as the name implies, is a check to determine the operating characteristics of each cylinder of the engine. Tendency for any cylinder or cylinders to be cold or to be only slightly warm indicates lack of or incomplete combustion within the cylinder. This must be corrected if optimum operation and power are to be obtained. Engine difficulties, which normally may be detected by use of the cold cylinder indicator (Magic Wand), are rough engine operation, excessive rpm drop during ignition system check, and high manifold pressure for a given rpm during ground check for a speed when propeller is in full low pitch position. The check will be accomplished when any of the foregoing conditions occur. Perform the cold cylinder check in the following manner:

CAUTION

Head the aircraft into the wind in order to minimize irregular cooling of individual cylinders, and to ensure even propeller loading during operation of engine.

a. Start and operate engine in accordance with applicable operator's manual (-10).

b. Place ignition switch in position at which excessive rpm drop was obtained. In cases where excessive rpm drop (over 125 rpm) is encountered on both R and L switch positions, or where excessive manifold pressure (over 29.6 in. Hg) is obtained at the given engine rpm, the engine will be run on either L or R switch positions, since it is necessary to make a test on each ignition switch position.

c. Operate engine at roughest speed between 1200 and 1600 rpm, or any rpm up to ignition check speed (2600 rpm), until a cylinder head

temperature reading of 150° to 170°C (302° to 338°F) is obtained or until temperatures stabilize at a lower reading. In cases where engine roughness is encountered at more than one speed, or there is an indication that a cylinder ceases to operate at idle speeds or at higher speeds, it will be desirable to run engine at each of these speeds and perform a cold cylinder check to locate all dead or intermittently operating cylinders. In cases where low power output or engine vibration is encountered at speeds above 1600 rpm, when operating both L and R ignition switches ON, the engine should be run at the speed where the difficulty is encountered with both ignition switches ON until the cylinder head temperature reading of 150° to 170°C (302° to 338°F) is obtained or until temperatures stabilize at a lower reading.

d. Shut down engine in accordance with TM 55-1510-201-10 after cylinder head temperatures have reached the above limits.

WARNING

Ensure ignition switches are in OFF position.

e. Record cylinder head temperature readings noted on cylinder head temperature gage.

f. As soon as propeller has ceased rotation, clip cold cylinder indicator lead to engine or propeller to ground the cold cylinder indicator.

g. Check and record relative temperature of each cylinder by pressing tip of cold cylinder indicator pick-up rod against each cylinder. Ensure that contact is made at same relative location on each cylinder. Make check immediately after engine shutdown.

h. Recheck any outstanding low values and the two cylinders having the highest readings to determine amount of cylinder cooling during check.

i. Compare temperature readings to determine which cylinders are dead or operating intermittently.

j. Check magneto P leads to determine that R switch is connected to right magneto and L switch is connected to left magneto prior to changing spark plugs or making ignition harness test on cylinders which are not operating or are operating intermittently.

k. Replace spark plugs in accordance with paragraph 5-168 on cylinders which are dead on operating intermittently. In addition, test ignition leads as outlined in paragraph 5-165. In cases where cylinder is completely dead with both ignition switches ON, difficulty may be

due to incorrect valve clearances, leaking intake pipes, or lack of compression (blow-by).

1. Conduct additional cold cylinder checks at different speeds in event any roughness is still encountered during ignition system test. Cooling of the engine between tests is not necessary, as airflow created by the propeller and cooling effect of the incoming fuel-air mixture into cylinder will be sufficient to cool any cylinders which are functioning on one test and fail to function on the subsequent test. For example, a set of readings obtained from a six-cylinder engine is listed below. (The cylinder head temperature at time engine was shut down was 71°C (160°F).

CYLINDER NO.	RIGHT MAGNETO RPM	LEFT MAGNETO RPM
1	180	170
2	100	150
3	170	175
4	70	155
5	145	150
6	60	50

m. Examination of temperature readings obtained indicates that cylinders No. 2, 4, and 6 are operating intermittently when operating on the bottom spark plugs (fired by right magneto). In addition, cylinder No. 6 is dead when operating on the top spark plugs (fired by left magneto). This indicates that cylinder No. 6 is completely dead, which will result in a higher than normal manifold pressure at a given rpm below propeller governor cut-in speed. However, ignition system test would not disclose this dead cylinder, since the cylinder is dead while on both the R and L switch positions. A dead cylinder may be caused by both spark plugs or ignition leads, or a combination thereof, being inoperative.

5-32. CYLINDER COMPRESSION TEST.

5-33. The performance of a cylinder compression test is designed to reduce the number of cylinders and/or engine failures in flight. Replacement of defective cylinders thus revealed will prevent unsatisfactory condition from progressing to extent of engine failure. A cylinder compression test should be accomplished any time faulty compression is suspected, and will be accomplished when audible blow-by is detected at time of propeller pull-through.

NOTE

Too obtain consistent readings, perform cylinder compression test immediately after engine has been shut down.

WARNING

Ensure ignition switch is in OFF position, mixture lever is in IDLE CUT-OFF position, and starter circuit breaker is pulled out.

a. Operational check of cylinder compression tester, type MK-1. The type MK-1 cylinder compression tester (figure 5-4) performs a dynamic compression test of each individual cylinder. The cylinder pressures are averaged, and any cylinders having abnormally low compression must be removed. This prevents the engine from being operated with a large variation of compression between individual cylinders. As this is a dynamic test, erratic valve clearances will affect the compression readings obtained. To ensure the most effective cylinder compression test and to eliminate the possibility of removing cylinders which are not defective, check cylinder compression tester for accuracy prior to accomplishing cylinder compression test. Testers which do not meet the requirements shall be returned to overhaul for repair.

(1) Attach cylinder compression tester to a source of compressed air known to be accurately gaged as to pressure output. Check cylinder compression tester under operating air pressure (80 to 100 psi).

(2) Transfer air pressure from known gaged source to cylinder compression tester. If tester has an error of 5 percent or more, adjust or replace tester as required.

WARNING

Before disconnecting cylinder compression tester from source of compressed air, ensure pressure is shutoff, and then press pressure relief button on cylinder compression tester to relieve all pressure.

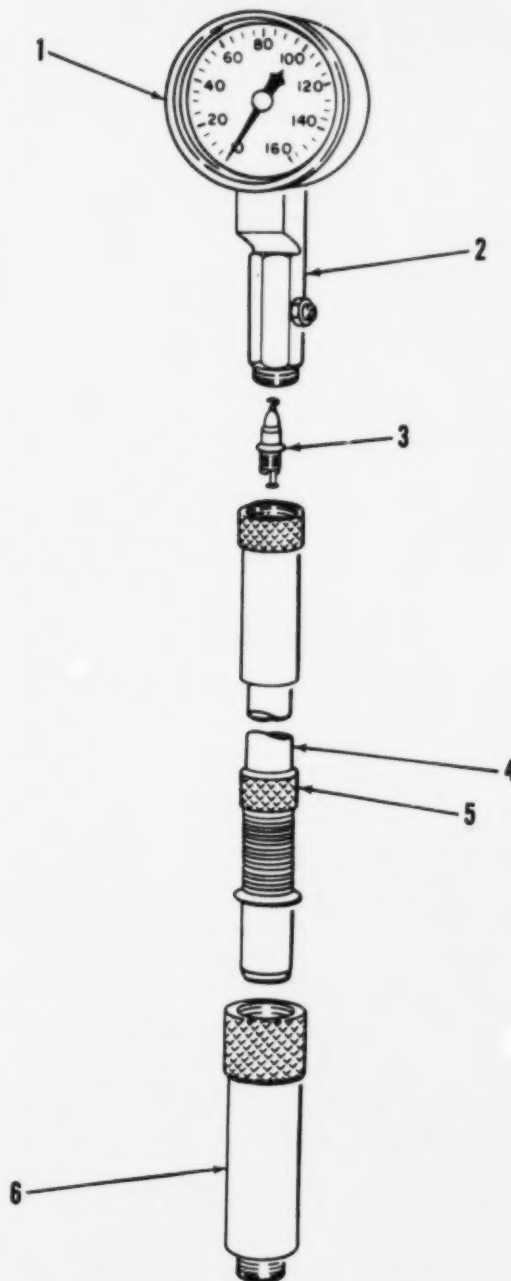
b. Cylinder compression test using cylinder compression tester. Type MK-1.

(1) Remove necessary engine cowling (Refer to paragraph 5-172.)

(2) Remove most accessible spark plug from each cylinder. (Refer to paragraph 5-168.)

(3) Ground all disconnected spark plug leads.

(4) Rotate engine with starter a minimum of 16 revolutions to expel any excess oil or loose



1. Gage
2. Relief valve
3. Check valve
4. Flexible hose
5. Small knurled sleeve
6. Spark plug adapter body section

Figure 5-4. Cylinder compression tester, MK-1

carbon from cylinders. Use external power source to provide power for energizing engine starter.

NOTE

Refer to TM 55-1500-204-25/1 for use of external power source (APU) on Department of the Army aircraft.

(5) Install cylinder compression tester in spark plug insert of each cylinder and tighten fingertight, or enough to effect a firm seal. To install tester, loosen small knurled sleeve (5, figure 5-4) three to four turns until assembly is free. Screw spark plug adapter body section (6) into spark plug bushings until rubber gasket is firmly seated. Maneuver flexible hose (4) until gage (1) is visible to operator. Tighten small knurled sleeve (5) to seal hose section inside body section.

(6) Rotate engine with starter, through the compression stroke, a minimum of threetimes. Record compression readings of cylinder.

(7) Repeat steps (2) through (6) above until compression of all cylinders has been tested and recorded.

(8) To evaluate and determine which cylinders have compression below minimum, total compression of all cylinders having readings of 20 psi and above. All cylinders with compression reading below 20 psi will be disregarded and classed as suspect. Before any detail work is done, two additional cylinder compression test should be performed to verify information obtained in first compression test. Normal or average cylinder compression should be used as a guide in interpreting compression readings. Possible conditions which will affect engine compression are:

- (a) Incorrect valve tappet clearances.
- (b) Worn, scuffed, or damaged pistons.
- (c) Broken piston rings.
- (d) Excessive wear of piston rings and cylinder walls.
- (e) Burned or warped valves.
- (f) Carbon particles between face and seat of valve.
- (g) Early or late valve timing.

(9) Divide total obtained by number of cylinders with readings above 20 psi. This will establish average cylinder compression pressures.

(10) Check individual cylinders with a reading of 20 percent or more below average cylinder compression in accordance with step (11) below. If compression remains 20 percent or more below established average, the cylinder

must be replaced. (Notify direct support maintenance unit.)

NOTE

When it is necessary to perform a compression test on one or more cylinders, compression of all cylinders will be tested, compression readings totaled, and minimum compression established as outlined in steps (2) through (6) above.

(11) The following procedures must be performed on engines having cylinders with compression values below the minimum required. The compression must be retested before condemning the suspected cylinders. The procedures are listed in the normal sequence that should be used; however, any sequence may be used, except the valves will not be checked for negative clearance or adjusted immediately after the engine has been operated.

(a) Remove rocker box covers on cylinders with low compression. (Refer to paragraph 5-34.) Turn crankshaft until piston is at top dead center on compression stroke. Check intake and exhaust valves for negative clearance. If valves are being held open due to negative clearance, rectify by making necessary repairs or adjusting valves. (Notify direct support maintenance unit.)

(b) With rocker box covers removed, rotate crankshaft until each valve is closed and piston is at least 2 inches below its top dead center position. Place a fiber drift on rocker arm directly over valve stem, and tap drift with a 1- or 2-pound mallet. Rotate crankshaft by hand or starter a minimum of eight revolutions to seat valves in a normal manner.

(c) Squirt a small quantity of lubricating oil (item 2, table 1-8) in top cylinder spark plug holes. Rotate crankshaft a minimum of eight revolutions by hand or starter.

(d) Install spark plugs and rocker box covers. (Refer to paragraphs 5-168 and 5-34.)

(e) Start engine in accordance with applicable operator's manual (-10). Operate engine at 1600 rpm for 3 minutes.

(f) Shut down engine in accordance with applicable operator's manual (-10). Retest compression as outlined in steps (1) through (6) above.

NOTE

A compression test check is not necessarily all inclusive in diagnosis of engine malfunctioning. Results of such a test should be thoroughly analyzed and other factors considered before deciding upon removal of an engine for return to direct support maintenance unit.

(12) Use DA Form 2408-15 cylinder compression checksheet. In cases where DA Form 2408-15 is used as a cylinder compression checksheet, retitle form as Cylinder Compression Checksheet. The sheets will be numbered separately in sets, for each affected engine.

(13) Install spark plugs. (Refer to paragraph 5-168.)

(14) Install engine cowl. (Refer to paragraph 5-172.)

5-34. ROCKER BOX COVERS.

5-35. The rocker box covers are made of stamped aluminum. Each cylinder has one rocker box cover to protect the rocker arm assembly from foreign material and to keep oil in the rocker box lubricating system from being expelled.

a. Removal. (1) Remove screws securing rocker box cover to cylinder heads.

(2) Remove rocker box cover and gasket.
b. Cleaning. (1) Clean rocker box cover with solvent (item 6, table 1-8).

(2) Clean all traces of gasket from rocker box cover and cylinder.

(3) Dry rocker box covers using a clean, lint-free cloth.

c. Inspection. (1) Inspect rocker box covers for cracks.

(2) Check rocker box covers for flatness. If necessary, lap faces of rocker box covers on a lapping plate, using a small amount of lapping compound (item 46, table 1-8). This will ensure rocker box covers bear evenly on gaskets.

d. Installation. (1) Install a new gasket on cylinder.

(2) Install rocker box cover and screws. Tighten screws to a torque of 35 inch-pounds.

5-36. VALVE MECHANISMS.

5-37. The valve mechanisms consists of valve rocker shafts, valve rocker arms, thrust washers, pushrods, and shroud tubes.

a. Removal. (1) Remove rocker box cover and gasket. (Refer to paragraph 5-34.)

(2) Rotate crankshaft until piston in cylinder is on top dead center of compression stroke.

NOTE

This stroke can be determined by lack of action of either valve when crankshaft is turned.

(3) Remove nuts and washers securing rocker

shaft covers to cylinder. Remove rocker shaft covers and gaskets.

(4) Remove valve rocker shafts, valve rocker arms, and thrust washers.

(5) Remove pushrods by grasping ball end and pulling outward through shroud tubes.

CAUTION

Tag or otherwise identify each valve mechanism part as to cylinder, intake or exhaust, and to position in relation to other part. This is necessary to assure that all parts are reinstalled in their original positions and locations.

(6) Rotate shroud tubes 90 degrees to release detent from spring on shroud tube.

(7) Remove shroud tubes from seal seats in cylinder head, then withdraw shroud tubes from seal retainers in crankcase.

(8) Remove shroud tube spring, shroud tube oil seals, shroud tube seal sleeve, and shroud tube washer from shroud tube.

b. Cleaning. (1) Clean all parts of the valve mechanism with solvent (item 6, table 1-8) and dry thoroughly with compressed air.

(2) Immediately after cleaning, lightly coat all parts with corrosion preventive (item 8, table 1-8).

c. Inspection. (1) Inspect pushrods for wear or looseness of ball ends. If ball ends are loose, replace push rods.

(2) Inspect valve rocker arm for cracks. If cracked, replace valve rocker arm.

(3) Inspect shroud tube spring and shroud tube washers for burrs, nicks, scratches, cracks, and wear. Replace all cracked or worn parts. Remove slight burrs, nicks, and scratches with abrasive cloth (item 31, table 1-8).

d. Installation. (1) Install shroud tube oil seal into seal retainer in crankcase.

(2) Install shroud tube oil seal on outer end of shroud tube.

(3) Install shroud tube sleeve over and on center of outer shroud tube oil seal.

(4) Install shroud tube spring over inner end of shroud tube so that detent notches in spring are approximately 90 degrees from detent on shroud tube.

(5) Install shroud tube washer over end of shroud tube and insert shroud tube through shroud tube oil seal at crankcase.

(6) Hold shroud tube with detent at inner end of unlocked position. Insert outer end of

shroud tube in hole in cylinder head, then turn shroud tube 90 degrees and lock detent on shroud tube with notches on spring.

NOTE

Insure that all oil seals are in position.

(7) Coat ball end of pushrod with corrosion preventive (item 8, table 19-2) and install pushrod through shroud tube.

NOTE

Press tightly against outer end of push rod and check for spring tension and free travel of unloaded or dry hydraulic tappet plungers.

(8) Install valve rocker shaft through valve rocker arms and thrust washers.

NOTE

Exhaust and intake valve rocker assemblies are different due to angle of valves. Exhaust rocker arm toes to the right when viewed from rear and intake rocker arm toes to the left when viewed from rear.

(9) Check valve clearance. (Refer to step e below.)

(10) Install rocker shaft cover gasket and rocker shaft cover. Secure rocker shaft cover to cylinder with nuts and washers.

(11) Install rocker box covers. (Refer to paragraph 5-34.)

e. Valve Adjustment. (1) Remove rocker box covers and one spark plug from each cylinder.

(2) Rotate crankshaft until piston in cylinder is on top dead center of compression stroke.

NOTE

The compression stroke can be determined by lack of action of either valve when crankshaft is turned.

(3) Check dry or unloaded valve clearance by pushing on pushrod end of valve rocker arm and checking clearance between end of valve rocker arm and tip of valve stem, using gage, ST23, NSN 5220-00-967-7711.

(4) If valve clearance is less than 0.028 inch or more than 0.080 inch, adjust clearance by using a longer or a shorter pushrod. Pushrods for the O-480-1B, and -3A engines are identified for length as follows:

P/N 66722 (short 3 grooves) 12.469 to 12.482 inches

P/N 66723 (medium 2 grooves) 12.496 to 12.509 inches

P/N 66724 (long 1 groove) 12.523 to 12.536 inches

P/N 71135 (short 2 grooves) 12.477 to 12.490 inches

P/N 71136 (medium 1 groove) 12.504 to 12.517 inches

P/N 71137 (long no grooves) 12.531 to 12.544 inches

P/N 73434 (short, number stamped on rod)

P/N 73435 (medium, number stamped on rod)

P/N 73436 (long, number stamped on rod)

NOTE

The 71 and 73 series rods are the same length. Review of above indicates that a number of rods are listed as "short" and "medium" yet, are identified with the same number of grooves. However, it is believed that all of the 66 series push rods have been replaced by the later 71 and 73 series rods.

(5) Coat all exposed parts of valve mechanism with corrosion preventive (item 8, table 1-8).

(6) Install rocker box covers. (Refer to paragraph 5-34.)

(7) Install spark plug. (Refer to paragraph 5-168.)

5-38. HYDRAULIC TAPPET ASSEMBLY.

5-39. The O-480-1B and O-480-3A engines use mushroom-type hydraulic tappet assemblies which automatically keep the valve clearance at zero.

a. Removal. (1) Remove valve mechanism. (Refer to paragraph 5-36.)

(2) Remove pushrod socket (2, figure 5-5) from hydraulic tappet assembly with finger as shown in figure 5-6. If pushrod socket is stuck, use a pair of needle nose pliers to loosen.

(3) Insert a piece of wire, bent at right angles, into space between plunger (11, figure 5-5) and tappet body (8). Turn wire 90 degrees to engage a coil of plunger spring (3) and withdraw plunger (11) and cylinder (9) as a unit.

CAUTION

Never use a magnet to withdraw plunger, as plunger ball can become magnetized off the seat, making unit inoperative.

(4) Push in spring end of plunger (11) and turn approximately one-quarter turn clockwise. Pull plunger (11) from cylinder (9).

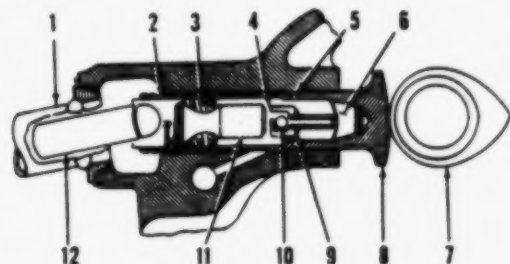
CAUTION

Keep plunger and cylinder of each assembly together. They are very closely and selectively fitted during manufacture and are not interchangeable.

b. Cleaning. (1) Clean all parts of hydraulic tappet assembly with solvent (item 6, table 1-8).

(2) Insure all oil is removed from inside plunger. This is necessary, as a check for correct pushrod length is made with a dry or unloaded hydraulic tappet assembly.

c. Inspection. (1) Inspect plunger for cracks and chips, especially around shoulder. (See figure 5-7.)



- | | |
|-------------------------|----------------------|
| 1. Shroud tube | 7. Camshaft |
| 2. Pushrod socket | 8. Tappet body |
| 3. Plunger spring | 9. Cylinder |
| 4. Oil pressure chamber | 10. Ball check valve |
| 5. Oil hole | 11. Plunger |
| 6. Oil supply chamber | 12. Pushrod |

Figure 5-5. Hydraulic tappet assembly

(2) Mark plunger assemblies for their respective places in crankcase, and place them on a flat machined surface as shown in figure 5-8. Lay a straight edge across shoulder surface. Any plunger assembly that is more than 1/32 inch below straightedge is collapsed and must be rejected. When a collapsed tappet has been found, entire cylinder assembly must be replaced.

(3) Check for leaking ball check valve by dipping plunger in lubricating oil (item 2, table 1-8). Hold tappet cylinder between thumb and middle finger in a vertical position with one hand. Then place plunger in position so that plunger just enters cylinder. Depress plunger

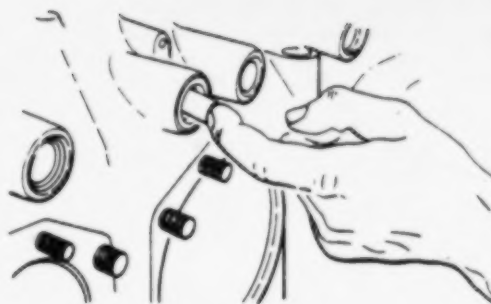


Figure 5-6. Pushrod socket removal

quickly with index finger. If plunger returns to approximately its original position, unit may be considered to be satisfactory. If, however, plunger does not return to its original position, ball check valve is not seating properly and must be cleaned. If, after cleaning, plunger remains collapsed, replace both cylinder and plunger.

d. Installation. (1) Install plunger (11, figure 5-5), with plunger spring (3) outward, in cylinder (9).

(2) Turn plunger (11) approximately one-quarter turn counterclockwise to lock plunger in place.

(3) Install cylinder (9) and plunger (11) in tappet body (8) with end of plunger spring (3) outward.

(4) Install pushrod socket (2), with concave end outward, in tappet body (8).

(5) Install valve mechanism. (Refer to paragraph 5-36.)

5-40. INTAKE PIPES.

5-41. Each cylinder is equipped with a steel intake pipe (23, figure 5-9). The intake pipes are

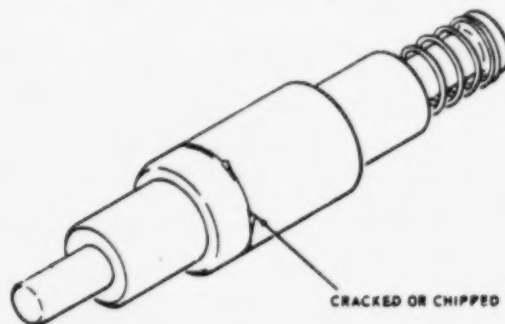


Figure 5-7. Cracked or chipped shoulder on plunger

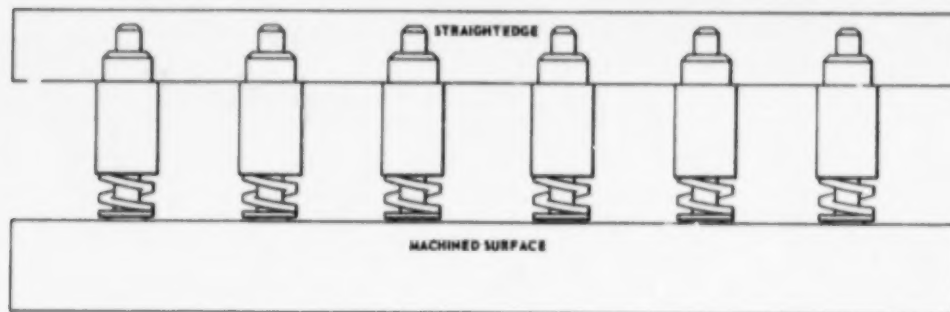


Figure 5-8. Checking for collapsed hydraulic plunger

located between the cylinders and the center zone induction box, which is an integral part of the engine oil sump (1). The outer end of the intake pipe (23) has a flange (27) which is secured to the cylinder intake port and the inner end is connected to the engine oil sump (1) with a hose (21) and hose clamp (22).

a. Removal. (1) Remove necessary engine cowlings. (Refer to paragraph 5-172.)

(2) Disconnect primer line and lower spark plug from cylinder.

(3) Remove clamps securing primer line and spark plug lead to intake pipe.

(4) Remove bolts (26, figure 5-9), lockwashers (25), and washers (24) securing intake pipe (23) to cylinder.

(5) Loosen hose clamps (22) securing hose (21) to intake pipe connection (20).

(6) Pull inner end of intake pipe (23) free of intake pipe connection (20) and remove intake pipe.

(7) Remove hose clamps (22) and hose (21) from intake pipe (23).

(8) Remove gasket (28) from cylinder.

b. Cleaning. Clean intake pipe, hose clamp, and intake pipe connection with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect intake pipe for dents, cracks, and chipped paint.

(2) Inspect hose clamp for cracks and distortion of worm gear.

(3) Inspect hose for deterioration.

(4) Inspect intake pipe connection for dents, cracks, and looseness in engine oil sump.

(5) Inspect flange for cracks and malformed stud holes.

d. Installation. (1) Install hose (21, figure 5-9) on inner end of intake pipe (23), and slide hose on intake pipe until hose is flush with end of intake pipe.

(2) Position gasket (28) over studs on intake port of cylinder.

(3) Install hose clamps (22) on hose (21) but do not tighten at this time.

(4) Position intake pipe (23) on cylinder and install washers (24), lockwashers (25), and bolts (26). Tighten nuts (26) to a torque of 75 inch-pounds.

NOTE

Studs at intake port on cylinder head are being replaced by two 1/4"-20 x 1-1/4" bolts for securing intake pipe to cylinder.

(5) Slide hose (21) down over intake pipe connection (20). Tighten hose clamps (22).

(6) Connect primer line and lower spark plug lead to cylinder.

(7) Secure primer line and lower spark plug lead to intake pipe with clamps.

(8) Install engine cowlings. (Refer to paragraph 5-172.)

5-42. OIL SUMP.

5-43. The oil sump (1, figure 5-9) has provisions for an integral intake manifold, a collection point for oil, and an oil drain plug. Oil sumps on O-480-1B and O-480-3A engines are similar except for the configuration of the intake manifold riser, which begins at the supercharger outlet pipe connection at the rear of the sump.

a. Cleaning. (1) Place a suitable drip pan under oil sump and spray external surface of oil sump with dry cleaning solvent (item 6, table 1-8).

(2) Allow solvent to air dry before starting engine.

b. Inspection. (1) Inspect oil sump for evidence

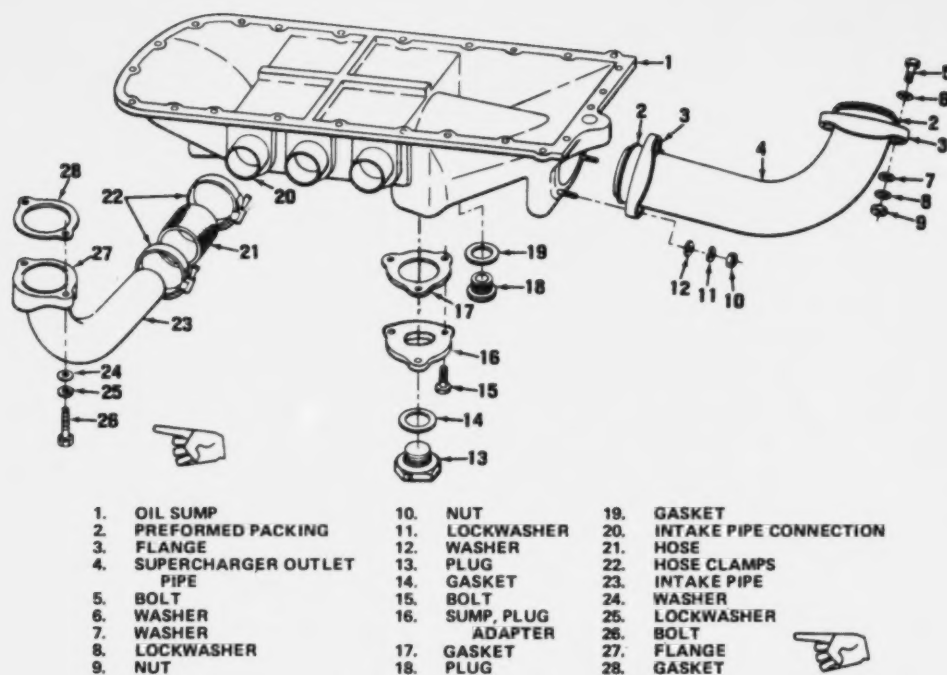


Figure 5-9. Oil Sump Installation.

of oil leaks around sump gasket.

(2) Inspect intake pipe connections for looseness.

(3) Inspect for missing or loose mounting bolts.

5-43.1. Oil Sump screens which have chip detectors must be modified up on installation as follows:

- Center mark on mounting plate and drill a 11/16 inch hole and tap for 3/4-16 UNF-3A threads.
- Install chip detector in the tapped hole.

5-44. SUPERCHARGER OUTLET PIPE.

5-45. The supercharger outlet pipe (4, figure 5-9) is located at the rear of the engine. One end of the supercharger outlet pipe connects to the rear of the oil sump (1) and the other end connects to the supercharger housing. As the fuel-air mixture leaves the supercharger, it is carried through the supercharger outlet pipe to the oil sump.

a. Removal. (1) Remove necessary engine cowlings. (Refer to paragraph 5-172.)

(2) Remove nuts (9, figure 5-9), lockwashers (8), washers (7), bolts (5), and washers (6) securing supercharger outlet pipe (4) to supercharger housing.

(3) Remove nuts (10), lockwashers (11), and washers (12) securing supercharger outlet pipe (4) to oil sump (1).

(4) Remove supercharger outlet pipe (4) from engine.

(5) Remove preformed packings (2) and flanges (3).

b. Cleaning. Clean supercharger outlet pipe with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect supercharger outlet pipe for dents, cracks, and distortion.

(2) Inspect flanges for cracks and malformed stud and bolt holes.

d. Installation. (1) Install flanges (3, figure 5-9) and preformed packings (2) on each end of supercharger outlet pipe (4).

(2) Position supercharger outlet pipe (4) on engine.

(3) Install washers (12), lockwashers (11), and nuts (10) securing supercharger outlet pipe (4) to oil sump (1).

(4) Install bolts (5) and washers (6); secure supercharger outlet pipe (4) with washers (7), lockwashers (8), and nuts (9).

(5) Install engine cowling. (Refer to paragraph 5-172.)

5-46. AIR INLET ADAPTER ELBOW. (U-8D, U-8G, RU-8D)

5-47. The air inlet adapter elbow (10, figure 5-10) is an alloy casting and is located between the carburetor and the supercharger air inlet housing (6). A supercharger drain valve (11) is installed in the lower section of the air inlet adapter elbow (10) to drain any fuel accumulations.

a. Removal. (1) Remove access plate on bottom of engine cowling.

(2) Disconnect drain hose from supercharger drain valve (11, figure 5-10).

(3) Remove carburetor. (Refer to paragraph 5-176.)

(4) Remove nuts (9) and washers (8) securing air inlet adapter elbow (10) to supercharger air inlet housing (6).

(5) Remove air inlet adapter elbow (10) and gasket (7) from supercharger air inlet housing (6).

b. Cleaning. Clean air inlet adapter elbow with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect air inlet adapter elbow for dents, cracks, and malformed bolt holes.

(2) Inspect studs for malformed threads and security of mounting.

d. Installation. (1) Install gasket (7, figure 5-10) over studs of supercharger air inlet housing (6).

(2) Position air inlet adapter elbow (10) on supercharger air inlet housing (6). Secure with washers (8) and nuts (9).

(3) Install carburetor. (Refer to paragraph 5-176.)

(4) Connect drain hose to supercharger drain valve (11).

(5) Install access plate on bottom of engine cowling.

5-48. AIR INLET ADAPTER ELBOW. (U-8F)

5-49. The air inlet adapter elbow (9, figure 5-11) is a welded aluminum casting and is located at the bottom of the supercharger air inlet housing (3). A supercharger drain valve (10) is installed in the lower section of the air inlet adapter elbow (9).

a. Removal. (1) Remove access plate on bottom of engine cowling.

(2) Disconnect throttle control (16, figure 5-11) from throttle crossover shaft lever (17).

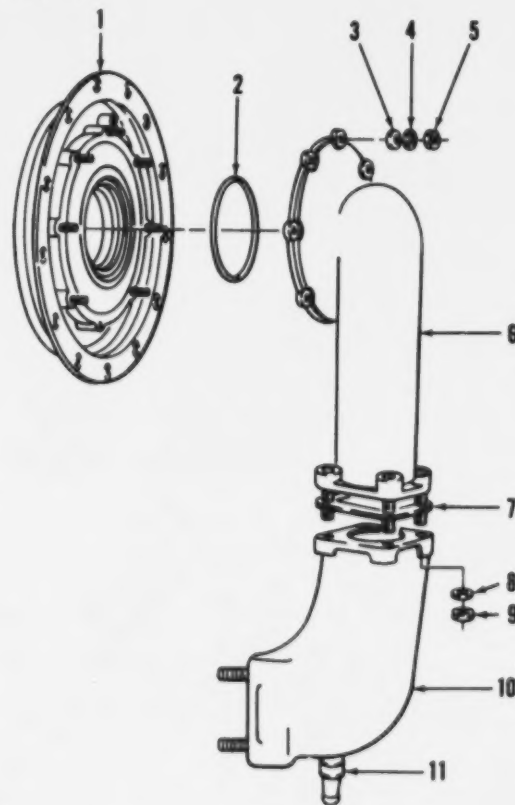
(3) Remove bolt securing alternate air control cable in its bracket and remove cable from bracket.

(4) Disconnect drain hose from supercharger drain valve (10).

(5) Loosen clamp on air inlet flexible hose.

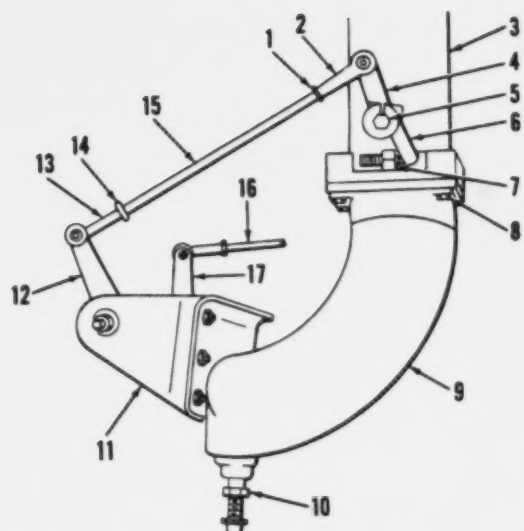
(6) Remove nuts and washers (8) securing air inlet adapter elbow (9) to supercharger air inlet housing (3).

(7) Remove air inlet adapter elbow (9) from engine.



- | | |
|-----------------------------------|------------------------------|
| 1. Supercharger housing | 7. Gasket |
| 2. Preformed packing | 8. Washer |
| 3. Washer | 9. Nut |
| 4. Lockwasher | 10. Air inlet adapter elbow |
| 5. Nut | 11. Supercharger drain valve |
| 6. Supercharger air inlet housing | |

Figure 5-10. Airlet adapter elbow and supercharger air inlet housing installation (U-8D, U-8G, and RU-8D)



- | | |
|-----------------------------------|------------------------------------|
| 1. Locknut | 10. Supercharger drain valve |
| 2. Rod end | 11. Angle |
| 3. Supercharger air inlet housing | 12. Throttle crossover shaft lever |
| 4. Throttle lever | 13. Rod end |
| 5. Throttle lever lock screw | 14. Locknut |
| 6. Idle stop | 15. Throttle interconnect rod |
| 7. Idle adjusting screw | 16. Throttle control |
| 8. Nut, washer | 17. Throttle crossover shaft lever |
| 9. Air inlet adapter elbow | |

Figure 5-11. Air inlet adapter elbow installation (U-8F)

(8) Remove gasket from studs of supercharger air inlet housing (3).

(9) Remove supercharger drain valve (10) from air inlet adapter elbow (9).

b. Cleaning. (1) Clean air inlet elbow with dry cleaning solvent (item 6, table 1-8).

(2) Dry with filtered compressed air.

c. Inspection. (1) Inspect air inlet adapter elbow for dents, cracks, and malformed bolt holes.

(2) Inspect welds of air inlet adapter for cracks in weld.

(3) Inspect bolts securing throttle interconnect rod to throttle lever and throttle crossover shaft lever for abnormal wear, crossed threads, and signs of shearing. Replace if necessary.

(4) Inspect throttle crossover shaft lever and throttle lever for hole elongation. Replace if signs of wear are evident.

(5) Inspect rod end bearings for evidence of wear and/or hole elongation. Replace if showing signs of wear.

NOTE

Enter on DA Form 2407 and 2408-13 inspections in steps c and e above in accordance with TM 38-750.

d. Installation. (1) Install supercharger drain valve (10, figure 5-11) in air inlet adapter elbow (9).

(2) Install a gasket over studs of supercharger air inlet housing (3).

(3) Position air inlet adapter elbow (9) over studs on supercharger air inlet housing (3).

(4) Install nuts and washers (8) securing air inlet adapter elbow (9) to supercharger air inlet housing (3).

(5) Install air inlet flexible hose and tighten clamp.

(6) Connect drain hose to supercharger drain valve (10).

(7) Install alternate air control cable in its bracket and secure with clamp.

(8) Install bolt, washer, and nut securing throttle control (16) to throttle crossover shaft lever (17). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

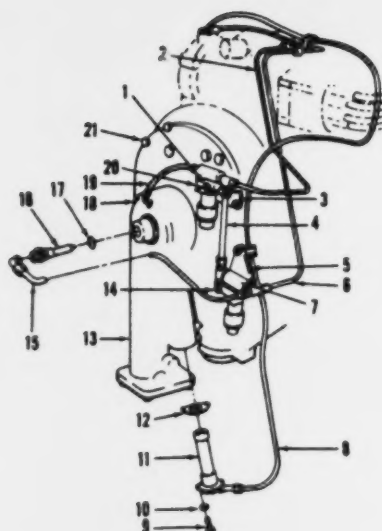
Ensure inner race of rod end bearings are tight against levers to prevent shearing of bolts through vibration.

(9) Install access plate on bottom of engine cowling.

NOTE

Replace castellated nut and cotter pin with self-locking nuts if installed. If self-locking nuts were installed, do not reuse. Install new self-locking nuts. (Refer to TM 55-1500-204-25/1).

PARAGRAPHS 5-50 THRU 5-53 DELETED.



- | | |
|---------------------------|------------------------------------|
| 1. Nut, washer | 13. Supercharger air inlet housing |
| 2. Tubing | 14. Bolt, washer, nut |
| 3. Bracket | 15. Hose |
| 4. Hose | 16. Fuel injection nozzle |
| 5. Bracket | 17. Preformed packing |
| 6. Tubing | 18. Auto-rich nozzle |
| 7. Fuel injector solenoid | 19. Hose |
| 8. Tube | 20. Auto-rich solenoid |
| 9. Screw | 21. Nut, washer |
| 10. Washer | |
| 11. Temperature bulb | |
| 12. Gasket | |

Figure 5-12. Supercharger air inlet housing installation (U-8F)

(2) Disconnect drain hose from supercharger drain valve.

(3) Remove supercharger drain valve from air inlet adapter elbow.

b. Installation. (1) Install supercharger drain valve in air inlet adapter elbow.

(2) Connect drain hose to supercharger drain valve.

(3) Install engine cowling. (Refer to paragraph 5-172.)

5-56. CYLINDER HEAD TEMPERATURE THERMOCOUPLE.

5-57. A bayonet-type cylinder head temperature thermocouple is installed beneath the lower spark plug in No. 5 cylinder of the engine to transmit signals to the cylinder head temperature indicator on the instrument panel.

a. Removal. (1) Open right engine cowling door.

(2) Unplug cylinder head temperature thermocouple from No. 5 cylinder.

(3) Remove tape covering electrical connections.

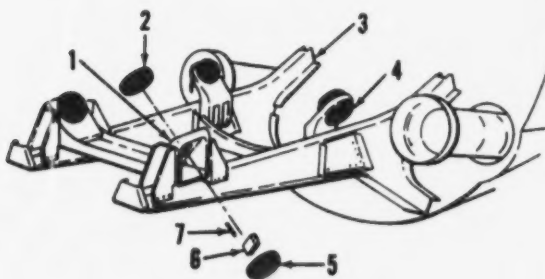
(4) Disconnect leads at connections and remove cylinder head temperature thermocouple.

b. Installation. (1) Connect lead at connections on cylinder head temperature thermocouple.

(2) Wrap connections with insulation tape (item 53, table 1-8).

(3) Plug cylinder head temperature thermocouple into No. 5 cylinder.

(4) Close right engine cowling door.



5-54. SUPERCHARGER DRAIN VALVE.

5-55. The supercharger drain valve is installed in the air inlet adapter elbow to drain excess fuel that may be present due to flooding of engine during engine starting.

a. Removal. (1) Remove necessary engine cowling. (Refer to paragraph 5-172.)

1. Forward engine mount
2. Upper sandwich mount
3. Engine mount assembly
4. Rear engine mount

5. Lower sandwich mount
6. Spacer
7. Pin

Figure 5-13. Engine mount assembly installation

5-58. ENGINE MOUNT ASSEMBLY.

5-59. The engine mount assembly (3, figure 5-13) is constructed primarily of clad aluminum sections, which are formed and riveted into a semicantilever bed-type frame. The engine mount assembly is secured to the firewall by four bolts. The engine mount assemblies used on all U-8 aircraft are almost identical. The forward and rear engine mounts (1 and 4) are made of aluminum and support the engine on the engine mount assembly. The upper and lower

sandwich mounts (2 and 5) are installed on the forward and rear engine mounts (1 and 4). Inspect the engine mount assembly as follows:

- (1) Inspect engine mount assembly and forward and rear engine mounts for security of mounting and for cracks.
- (2) Inspect engine mount heat shields for cracks.
- (3) Inspect installed engine mount bolts for alignment with painted reference marks on bolts.
- (4) Inspect sandwich mounts for deterioration.
- (5) Inspect spacers for broken pins and sandwich mounts for shifting.

SECTION III AIR INDUCTION SYSTEM**5-60. CARBURETOR AIR INDUCTION SYSTEM. (U-8D, U-8G, RU-8D)**

5-61. Provisions for both hot and cold air are included in the carburetor air induction system. Cold air enters through the air intake located in the lower engine cowling section. Air passes through a screen mesh filter, a mixture box, and on to the carburetor. Heater mufflers installed around exhaust stacks provide heated alternate air to the carburetor. This alternate air is provided in the event impact ice closes the air intake. The mixture box consists of a rotary-type air valve. When the valve is in the COLD AIR (normal) position, the air passes straight through from the air filter to the carburetor. (See figure 5-14.) When the valve is positioned in the HOT AIR (alternate) position, a passage way is opened between the alternate air inlet and the carburetor. The cold air passage is closed as the valve is moved to the HOT AIR position. The air valves are controlled by push-pull handles, one for each engine, located on the left subpanel next to the control console. A spring-loaded door is installed in the air intake duct forward of the air filter to provide an alternate source of cold air.

5-62. CARBURETOR AIR VALVE. (U-8D, U-8G, RU-8D)

5-63. The carburetor air valve (17, figure 5-15) is a rotary-type valve which controls hot and cold carburetor induction air. When the carburetor air valve is in the COLD AIR (normal) position, cold air entering the ram air inlets passes through the carburetor air valve to the carburetor. When the carburetor air valve is in the HOT AIR (alternate) position, the cold

air passage is closed and hot air from the exhaust stacks is drawn through the carburetor air valve to the carburetor.

- a. Removal. (1) Open engine cowling doors.
- (2) Loosen hose clamps (5 and 7, figure 5-15) and remove alternate air duct (6).
- (3) Loosen hose clamps (13 and 15) and remove carburetor air duct (14).
- (4) Loosen hose clamps (8 and 10) and remove hose (9).
- (5) Disconnect alternate air valve control from control arm (16).
- (6) Disconnect electrical plug from carburetor air temperature sensing bulb.
- (7) Remove bolts (18) and washers (19) securing carburetor air valve (17) to carburetor.
- (8) Remove bolts (2) and washers (3) securing carburetor air valve (17) to bracket (1).
- (9) Remove carburetor air valve (17) from engine.
- (10) Remove gasket (4).
- (11) Remove drain valve adapter (11) and preformed packing (12).
- (12) Remove carburetor air temperature sensing bulb. (Refer to paragraph 5-64.)
- b. Cleaning. (1) Clean carburetor air valve with dry cleaning solvent (item 6, table 1-8).
- (2) Clean alternate air duct and carburetor air duct with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).
- (3) Clean mounting surfaces of carburetor and carburetor air valve of any gasket material.
- c. Inspection. (1) Inspect carburetor air valve for cracks, dents, and malformed bolt holes.
- (2) Inspect hose clamps for cracks.
- (3) Inspect alternate air duct and carburetor air duct for deterioration and cracks.
- (4) Inspect control arm for cracks, worn bushings and security of mounting.

d. Installation. (1) Install carburetor air temperature sensing bulb. (Refer to paragraph 5-64.)

(2) Install preformed packing (12, figure 5-15) over end of drain valve adapter (11) and install drain valve adapter in carburetor air valve (17).

(3) Install gasket (4) over studs on carburetor.

(4) Position carburetor air valve (17) on carburetor. Ensure that gasket is seated under carburetor air valve.

(5) Install washers (3) and bolts (2) securing carburetor air valve (17) to bracket (1).

(6) Install washers (19) and bolts (18) securing carburetor air valve (17) to carburetor.

(7) Connect electrical plug to carburetor temperature sensing bulb.

(8) Connect alternate air valve control to control arm (16) with bolt, washer, and self-locking, castellated nut. Tighten nut to a torque of 20 to 30 inch-pounds. Install cotter pin.

(9) Install hose (9) and secure with hose clamps (8 and 10).

(10) Install carburetor air duct (14) and secure with hose clamps (13 and 15).

(11) Install alternate air duct (6) and secure with hose clamps (5 and 7).

(12) Close engine cowling doors.

5-64. CARBURETOR AIR TEMPERATURE SENSING BULB. (U-8D, U-8G, RU-8D)

5-65. The carburetor air temperature sensing bulb is located in the carburetor air valve and transmits signals to the carburetor temperature gage. The carburetor temperature gage then gives the pilot an indication of carburetor air inlet temperature.

a. Removal. (1) Disconnect electrical connector plug from carburetor air temperature sensing bulb.

(2) Cut lock wire and remove carburetor air temperature sensing bulb from carburetor air valve, being careful not to damage bulb.

(3) Install a cap over open port to prevent foreign matter from entering air induction system.

b. Installation. (1) Remove cap from port.

(2) Install carburetor air temperature sensing bulb in carburetor air valve and secure with lock wire.

(3) Connect electrical connector plug to carburetor air temperature sensing bulb.

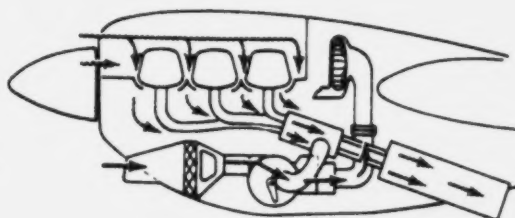
5-66. ALTERNATE AIR VALVE CONTROL. (U-8D, U-8G, RU-8D)

5-67. The alternate air valve control consists of a push-pull handle, one for each engine, located on the left subpanel. Pulling the push-pull

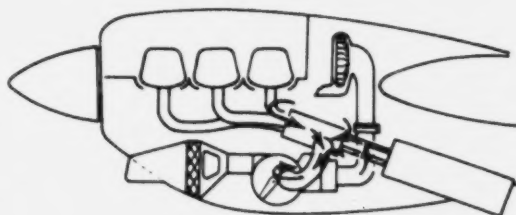
handles fully out operates the carburetor air valve in each carburetor duct system, by restricting the flow of normal ram air from the nacelle air scoops, and furnishes heated air from heater muffs around the exhaust stacks for carburetor heat.

a. Removal. (1) Open engine cowling doors.

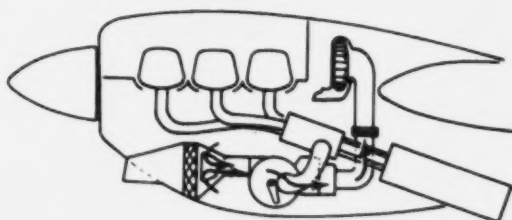
(2) Disconnect alternate air valve control from control arm on carburetor air valve.



COLD (FILTERED) AIR
NORMAL (GROUND AND FLIGHT OPERATIONS)



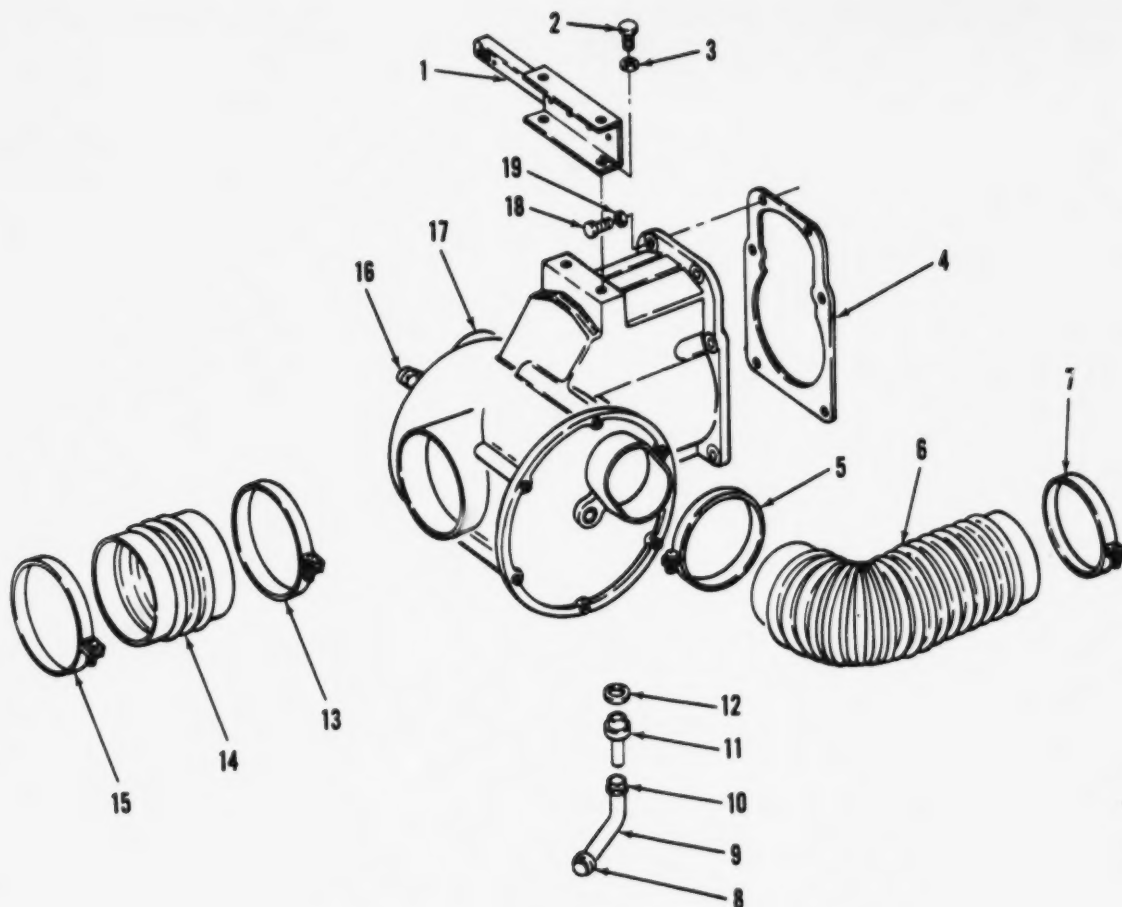
HEATED AIR



ALTERNATE AIR

-----> ENGINE COOLING AND EXHAUST
-> AIR INDUCTION

Figure 5-14. Carburetor air induction system (U-8D, U-8G, and RU-8D)



- | | |
|-----------------------|--------------------------|
| 1. Bracket | 11. Drain valve adapter |
| 2. Bolt | 12. Preformed packing |
| 3. Washer | 13. Hose clamp |
| 4. Gasket | 14. Carburetor air duct |
| 5. Hose clamp | 15. Hose clamp |
| 6. Alternate air duct | 16. Control arm |
| 7. Hose clamp | 17. Carburetor air valve |
| 8. Hose clamp | 18. Bolt |
| 9. Hose | 19. Washer |
| 10. Hose clamp | |

Figure 5-15. Carburetor air valve installation (U-8D, U-8G, and RU-8D)

(3) Loosen lock nut and remove rod end from alternate air valve control.

(4) Remove forward floorboards and carpeting. (Refer to paragraphs 4-82 and 4-84, or 4-131 and 4-133.)

(5) Remove center section wing leading edge. (Refer to paragraph 4-241.)

(6) Remove clamps and grommets securing alternate air valve control to aircraft.

NOTE

When removing clamps, mark alternate air valve control on both sides of clamps to aid in relocation and rerouting. If a new alternate air valve control is to be installed, these position marks should be transferred to new alternate air valve control.

(7) Remove ball and grommet from firewall.

(8) Remove retaining nut from back of subpanel and pull alternate air valve control from aircraft.

b. Cleaning. Clean alternate air valve control with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect alternate air valve control for cracks and wear.

(2) Inspect grommets for deterioration.

(3) Inspect rod end for malformed threads.

(4) Inspect clamps for cracks.

d. Installation. (1) Route alternate air valve control into position.

(2) Install retaining nut securing alternate air valve control to back of subpanel.

(3) Install ball and grommet at firewall.

(4) Install all clamps and grommets securing alternate air valve control.

(5) Install rod end on alternate air valve control.

(6) Adjust rod end so that carburetor air valve control arm is against cold air stop when pushpull handle is fully in. Tighten lock nut securing rod end.

(7) Install forward floorboard and carpeting. (Refer to paragraphs 4-82 and 4-84, or 4-131 and 4-133.)

(8) Install center section wing leading edge. (Refer to paragraph 4-241.)

(9) Close engine cowling doors.

5-68. CARBURETOR AIR FILTER.

5-69. The carburetor air filter consists of a replaceable element encased in a two piece frame and screen assembly and is installed in the carburetor air scoop.

a. Removal. (1) Disconnect fasteners securing carburetor air filter door to lower engine cowling.

(2) Slide carburetor air filter out through access opening.

CAUTION

Filter element is treated with a special wetting agent. Do not wash or reuse when contaminated by foreign material.

b. Replacement of Element. Replace carburetor air filter element as follows:

(1) Disassemble frame and screen assembly by removing four screws and separating the two halves. Retain screws for reassembly.

(2) Remove and discard element.

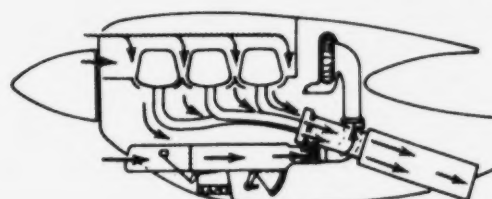
(3) Install new element in female half of frame and screen assembly.

NOTE

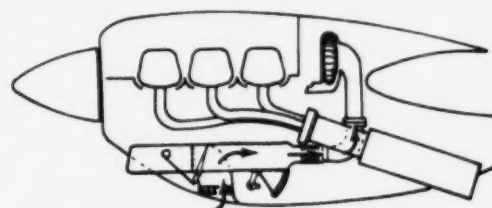
Element is slightly larger than frame to provide positive filtering. It will be necessary to compress edges of element slightly for installation of element in frame and screen assembly.

(4) Assemble two halves of frame and screen assembly and secure with four screws.

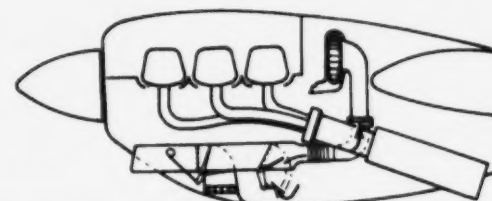
c. Inspection. (1) Inspect carburetor air filter housing for cracks, missing rivets, dents and distortion.



COLD (RAM) AIR
NORMAL (FLIGHT OPERATIONS)



COLD (FILTERED AIR)
NORMAL (GROUND OPERATIONS)



ALTERNATE AIR

→ ENGINE COOLING AND EXHAUST
→ AIR INDUCTION

Figure 5-16. Air induction system (U-8F)

(2) Inspect air filter assembly for cracks, distortion, obvious damage and cleanliness. Inspect filter element for proper installation and replace if contaminated by foreign material.

d. Installation. (1) Slide carburetor air filter through access opening.

(2) Position carburetor air filter door on lower engine cowling and secure with fasteners.

5-70. AIR INDUCTION SYSTEM. (U-8F)

5-71. Provisions are made of three sources of induction air on the U-8F aircraft. Cold air has two sources, ram air and filtered air. Ram air enters the induction system through an air scoop located in the front part of the lower engine cowling section. (See figure 5-16.) A three-position air switch on the subpanel, marked RAM, AUTO, and FILTERED, controls the cold air source. When the switch is in the AUTO position, the cold engine air source is automatically selected through the landing gear switch circuit. When the landing gear switch is in the DOWN position, filtered air is selected. When the landing gear switch is moved to the UP position, ram air is selected. The automatically selected source of cold engine air may be changed at any time by moving the switch to the desired position. Warm air is admitted through a door on the back of the engine air duct and is controlled by push-pull controls located on each side of the pedestal below the subpanel.

NOTE

Amber lights indicate that the system is in the RAM position; green lights indicate that the system is in the FILTERED position.

5-72. INDUCTION AIR VALVE. (U-8F)

5-73. The induction air valve consists of an electrically actuated valve to select filtered air or ram cold air. The induction air valve is controlled by a switch on the subpanel or by the landing gear selector switch. The heated (alternate) air is selected by the alternate air valve control. If the cold induction air duct becomes clogged by ice, manually moving the alternate air valve to alternate air control on the left subpanel is the only way the engine can get alternate air.

a. Removal. (1) Remove engine cowling. (Refer to paragraph 5-172.)

(2) Remove bolts, washers, and nuts securing induction air valve to ram air intake duct.

(3) Remove bolts, washers, and nuts securing induction air valve to lower engine cowling.

(4) Remove induction air valve from lower engine cowling.

b. Cleaning. (1) Clean induction air valve with dry cleaning solvent (item 6, table 1-8).

(2) Dry with dry, filtered, compressed air.

c. Inspection. (1) Inspect induction air valve for dents, cracks, and malformed bolt holes.

(2) Inspect control arm for cracks, worn bushings, and security of mounting.

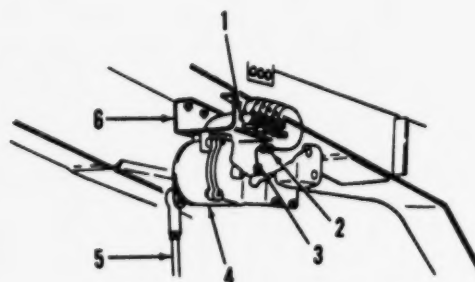
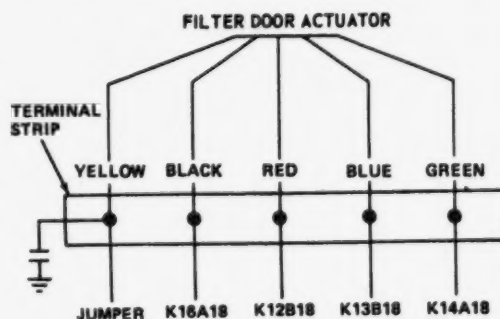
(3) Inspect valve door for cracks, worn hinge, broken or missing spring and security of mounting.

d. Installation. (1) Position induction air valve in lower engine cowling.

(2) Install bolts, washers, and nuts securing induction air valve to lower engine cowling.

(3) Install bolts, washers, and nuts securing induction air valve to ram air intake duct.

(4) Install engine cowling. (Refer to paragraph 5-172.)



- | | |
|---------------------|-------------------------|
| 1. Electrical leads | 4. Filter door actuator |
| 2. Clamp | 5. Control rod |
| 3. Clamp | 6. Mounting bracket |

Figure 5-17. Filter door actuator installation

5-74. FILTER DOOR ACTUATOR. (U-8F)

5-75. The filter door actuator (4, figure 5-17) consists of a motor and cam mechanism. Two microswitches are provided to operate the induction air valve in the air induction system of each engine. The filter door actuator is controlled by a three-position switch on the subpanel, marked FILTER, AUTO, and RAM.

a. Removal. (1) Disconnect electrical leads (1, figure 5-17).

(2) Disconnect control rod (5) from control arm on filter door actuator (4).

(3) Cut lock wire and remove bolts securing filter door actuator (4) to mounting bracket (6).

(4) Remove filter door actuator (4) from mounting bracket (6).

b. Inspection. (1) Inspect filter door actuator for cracks, and evidence of overheating.

(2) Inspect terminal for cracks.

(3) Inspect electrical leads for breaks and condition of insulation.

c. Installation. (1) Install filter door actuator (4, figure 5-17) on mounting bracket (6) and secure with bolts. Secure bolts with lock wire.

(2) Connect control rod (5) to control arm on filter door actuator (4).

(3) Connect electrical leads (1) to terminal strip as shown in figure 5-17.

5-75A. RIGGING PROCEDURES**Adjusting the Ram Air Filter Door**

a. Locate the ram air filter and actuator on the lower left hand side of the engine.

b. Disconnect the control rod, located between the ram air filter door control arm and the actuator, at the ram air filter door control arm.

c. Actuate the motor to place the control arm for the actuator in its most forward (FILTERED AIR) position.

d. Set the control arm for the ram air filter to the closed position (as far forward as possible).

e. Maintain the positions in steps c and d and align, adjust and connect the control rod to the ram air filter door control arm.

NOTE

Air pressure on the ram air door may cause it to open slightly during flight. This may be prevented when adjusting the ram air door control rod. After aligning the control rod, turn the rod end 1/2 revolution (clockwise) before connecting it to the ram air door control arm.

5-76. ALTERNATE AIR VALVE CONTROL. (U-8F).

5-77. The alternate air valve control consists of a push-pull handle, one for each engine, located on the left subpanel. The alternate air valve control is connected to a manually operated door located in the induction plenum. When alternate air is applied, the manually operated door moves to block the normal air intake, thereby reducing air pressure within the induction plenum.

a. Removal. (1) Open engine cowling doors.

(2) Disconnect alternate air valve control from control arm on induction air valve.

(3) Loosen lock nut and remove rod end.

(4) Remove flight compartment seats, carpeting and floor webs. (Refer to paragraphs 4-159, 4-175, and 4-177.)

(5) Remove center section wing leading edge. (Refer to paragraph 4-241.)

(6) Remove clamps and grommets securing alternate air valve control to aircraft.

NOTE

When removing clamps, mark alternate air valve control on both sides of clamps to aid in relocating and rerouting. If a new alternate air valve control is to be installed, these position marks should be transferred to new alternate air valve control.

(7) Remove ball and grommet from firewall.

(8) Remove retaining nut securing alternate air valve control to mounting bracket beneath subpanel and pull alternate air valve control from aircraft.

b. Cleaning. Clean alternate air valve control with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect alternate air valve control for cracks and wear.

(2) Inspect rod end for condition of bearing and malformed threads.

(3) Inspect grommets for deterioration.

(4) Inspect clamps and brackets for cracks.

d. Installation. (1) Route alternate air valve control into position.

(2) Install retaining nut securing alternate air valve control to mounting bracket beneath subpanel.

(3) Install ball and grommet on firewall.

(4) Install all clamps and grommets securing alternate air valve control to aircraft.

(5) Install rod end on alternate air valve control.

(6) Adjust rod end so that induction air valve is closed when push-pull handle is fully in. Tighten lock nut securing rod end.

(7) Connect rod end to induction air valve.

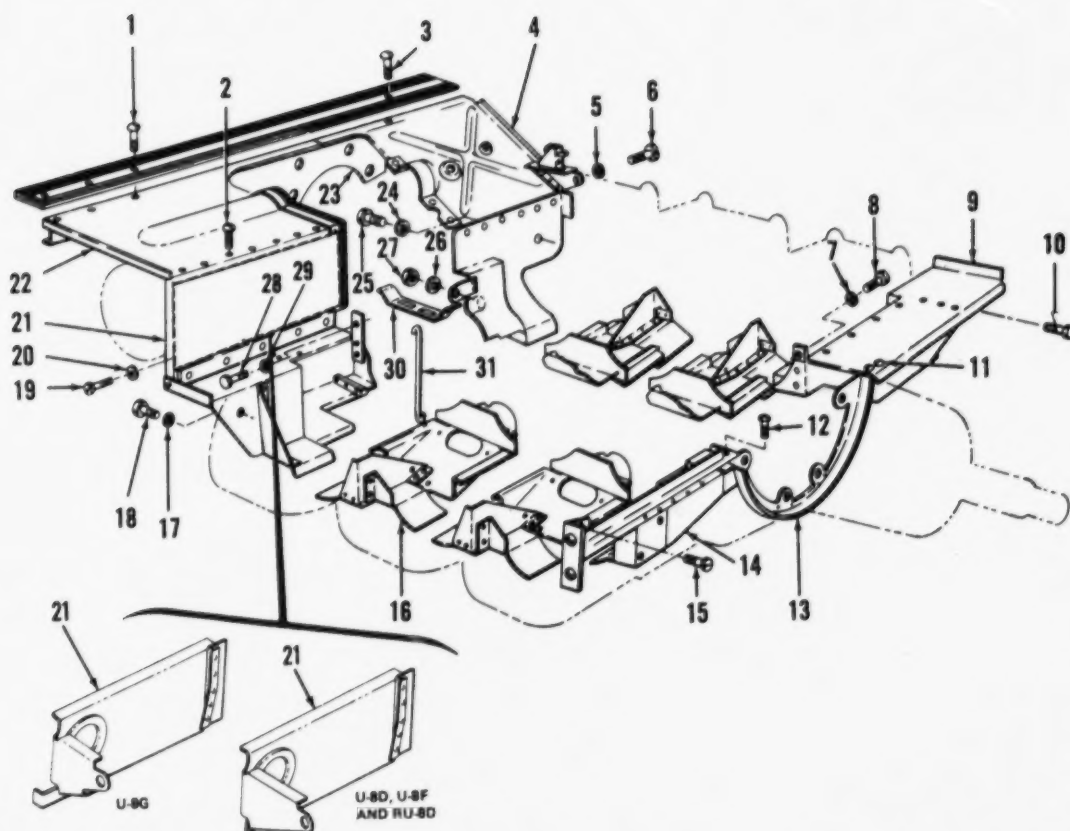
(8) Install flight compartment floor webs, carpeting and seats. (Refer to paragraphs 4-177, 4-175, and 4-159.)

(9) Install center section wing leading edge. (Refer to paragraph 4-241.)

(10) Close engine cowl doors.

5-78. BAFFLES.

5-79. Baffles are provided on the aircraft to build up pressure above the cylinders. This pressure forces cooling air down through and around the cylinder cooling fins, thus cooling the cylinders. The baffles are of two types; engine baffles and intercyylinder baffles. (See figure 5-18.) Left and right engine baffles are located at each end of the engine. Engine baffles are used to seal the space between engine and cowling. Intercylinder baffles are used to seal the space



- | | | | |
|---------------------|-----------------------------------|----------------------------------|-------------------|
| 1. Screw | 9. Left front baffle | 17. Washer | 25. Bolt |
| 2. Screw | 10. Screw | 18. Screw | 26. Washer |
| 3. Screw | 11. Screw | 19. Screw | 27. Nut |
| 4. Left rear baffle | 12. Screw | 20. Washer | 28. Bolt |
| 5. Washer | 13. Front baffle support assembly | 21. Lower baffle section | 29. Washer |
| 6. Screw | 14. Right front baffle | 22. Upper baffle section | 30. Retainer |
| 7. Washer | 15. Screw | 23. Rear baffle support assembly | 31. Retainer hook |
| 8. Bolt | 16. Intercylinder baffle | 24. Washer | |

Figure 5-18. Baffle installation

between engine and cowling. Intercylinder baffles are located below and between cylinders No. 1 and 3, 3 and 5, 2 and 4, and 4 and 6. Intercylinder baffles are used to seal the space between cylinders and to direct air flow into the space between cylinder cooling fins.

a. Removal. (1) Remove left front baffle (9, figure 5-18) as follows:

- (a) Open engine cowling doors.
- (b) Remove screws (11) securing left front baffle (9) to front baffle support assembly (13).
- (c) Remove bolt (8), washer (7), and screw (10) securing left front baffle (9) to cylinder No. 2.

(d) Remove left front baffle (9) from engine.

(2) Remove left rear baffle (4) as follows:

- (a) Disconnect propeller control rod end from governor control arm. Remove propeller control clamps located on top of engine and grommet in left rear baffle (4).

(b) Pull propeller control out of left rear baffle (4) and position it so it will not interfere with baffle removal.

(c) On U-8F aircraft, disconnect fuel injection pump fuel line from fitting on both sides of left rear baffle (4).

CAUTION

Cap fuel lines with plastic caps to prevent foreign matter from entering fuel lines.

(d) Disconnect tachometer generator cannon plug. Pull lead out of left rear baffle (4) and position lead so it will not interfere with baffle removal.

(e) Disconnect propeller anti-icing line from fitting on both sides of left rear baffle (4).

(f) Remove starter. (Refer to paragraph 12-27.)

(g) Remove screws (3) securing left rear baffle (4) to rear baffle support assembly (23).

NOTE

Removal of oil cooler access panel will aid in the removal of the rear row of screws.

(h) Remove nut (27) and washer (26) securing left rear baffle (4) to accessory housing.

(i) Remove bolt (25) and washer (24) securing left rear baffle (4) to rear of cylinder No. 6.

(j) Remove screw (6) and washer (5) securing left rear baffle (4) to end of cylinder No. 6.

(k) Remove left rear baffle (4) from engine.

(3) Remove right front baffle (14) as follows:

(a) Remove screws (12) securing right front baffle (14) to front baffle support assembly (13).

(b) Remove screw (15) securing right front baffle (14) to cylinder No. 1.

(c) Remove right front baffle (14) from engine.

(4) Remove right rear baffle assembly as follows:

(a) Disconnect electrical leads to generator noise filter.

NOTE

Tag electrical leads for proper identification at installation.

(b) Remove generator air intake shroud.

(c) Remove screws (2) securing upper baffle section (22) to lower baffle section (21).

(d) Remove screws (1) securing upper baffle section (22) to rear baffle support assembly (23).

NOTE

Removal of oil cooler access panel will aid in the removal of the rear row of screws.

(e) Remove upper baffle section (22) from engine.

(f) Remove bolt (28) and washer (29) securing lower baffle section (21) to engine.

(g) Remove screw (18) and washer (17) securing lower baffle section (21) to rear of cylinder No. 5.

(h) Remove screw (19) and washer (20) securing lower baffle section (21) to end of cylinder No. 5.

(i) Remove lower baffle section (21) from engine.

(5) Remove intercylinder baffles (16) as follows:

NOTE

Intercylinder baffles may be removed separately or simultaneously.

(a) Remove intake pipe that crosses under intercylinder baffle to be removed. (Refer to paragraph 5-41.)

(b) Remove rocker box oil drain tube that crosses under intercylinder baffle to be removed.

(c) Disengage retainer hook (31) from retainer (30).

NOTE

A piece of rod, bent at a right angle, may be used to disengage retainer hook.

(d) Remove retainer hook (31) and retainer (30).

(e) Remove intercyylinder baffle (16) from engine.

b. Cleaning. (1) Clean baffles with dry cleaning solvent (item 6, table 1-8).

(2) Wipe each baffle dry using a clean, lint-free cloth.

c. Inspection. (1) Inspect baffles for cracks, dents, chafing, and malformed screw and bolt holes.

(2) Inspect seals and rubber strips for wear and deterioration.

d. Installation. (1) Install intercyylinder baffles (16, figure 5-18) as follows:

NOTE

Intercylinder baffles may be installed separately or simultaneously.

(a) Position intercyylinder baffle (16) between cylinders.

(b) Hook retainer hook (31) into intercyylinder baffle (16).

(c) Install retainer (30) on cylinder.

NOTE

Ensure that retainer is properly aligned with intercyylinder baffle.

(d) Engage retainer hook (31) into retainer (30).

(e) Install rocker box oil drain tube.

(f) Install intake pipe. (Refer to paragraph 5-41.)

(2) Install right rear baffle assembly as follows:

(a) Position lower baffle section (21) on engine.

(b) Install screw (18) and washer (17) securing lower baffle section (21) to rear of cylinder No. 5.

(c) Install screw (19) and washer (20) securing lower baffle section (21) to end of cylinder No. 5.

(d) Install bolt (28) and washer (29) securing lower baffle section (21) to engine.

(e) Position upper baffle section (22) on engine.

(f) Install screws (1) securing upper baffle section (22) to rear baffle support assembly (23).

(g) Install screws (2) securing upper baffle section (22) to lower baffle section (21).

(h) Install generator intake shroud.

(i) Connect electrical leads to generator noise filter.

(j) Install oil cooler access panel, if removed.

(3) Install right front baffle (14) as follows:

(a) Position right front baffle (14) on engine.

(b) Install screws (15) securing right front baffle (14) to cylinder No. 1.

(c) Install screws (12) securing right front baffle (14) to front baffle support assembly (13).

(4) Install left rear baffle (4) as follows:

(a) Position left rear baffle (4) on engine.

(b) Install screw (6) and washer (5) securing left rear baffle (4) to end of cylinder No. 6.

(c) Install bolt (25) and washer (24) securing left rear baffle (4) to rear of cylinder No. 6.

(d) Install nut (27) and washer (26) securing left rear baffle (4) to accessory housing.

(e) Install screws (3) securing left rear baffle (4) to rear baffle support assembly (23).

(f) Install starter. (Refer to paragraph 12-40.)

(g) Apply a light coat of thread compound (item 44, table 1-8) to threads of fitting and connect propeller anti-icing line to fitting on both sides of left rear baffle (4).

(h) Route tachometer generator cannon plug through left rear baffle (4) and connect to tachometer generator. Secure cannon plug with lock wire.

(i) On U-8F aircraft, remove plastic caps from fuel line, apply a light coat of thread compound (item 44, table 1-8) to fitting, and connect fuel injection pump fuel line to fitting on both sides of left rear baffle (4).

(j) Route propeller control through left rear baffle (4), install grommet, and connect propeller control rod end to governor control arm.

(k) Install propeller control clamps on top of engine.

(5) Install left front baffle (9) as follows:

(a) Position left front baffle (9) on engine.

(b) Install bolt (8), washer (7), and screw (10) securing left front baffle (9) to cylinder No. 2.

(c) Install screws (11) securing left front baffle (9) to front baffle support assembly (13).

(d) Close engine cowling doors.

SECTION IV EXHAUST SYSTEM

5-80. DESCRIPTION.

5-81. Exhaust gases from the engine are directed rearward through exhaust stacks into augments tubes. A heater muff, installed around the exhaust stacks on U-8D, U-8G, and RU-8D aircraft, provides heated alternate air to the carburetor under icing conditions.

5-82. EXHAUST STACKS.

5-83. An exhaust stack is installed on each cylinder. The exhaust stacks from a cluster, three on each side of the engine, which eject exhaust gases into the augments tubes.

a. Removal. (1) Open engine cowling doors.

(2) Remove clamps at lower end of exhaust stacks.

(3) Remove nuts securing exhaust stacks to cylinders.

(4) On U-8D, U-8G, and RU-8D aircraft, withdraw exhaust stack from heater muff.

b. Cleaning. Clean exhaust stack with dry cleaning solvent (item 6, table 1-8) and allow to air dry.

c. Inspection. (1) Inspect exhaust stacks for cracks, dents, hot spots, and chafing.

(2) Inspect clamps for cracks.

(3) Inspect exhaust stack flanges for warping.

NOTE

To eliminate exhaust stack leaks resulting from warped exhaust pipe flanges, install an intake gasket P/N 71973, FSN 2810-988-3670, between two copper exhaust gaskets P/N 73720, FSN 5330-069-9647. Exhaust gasket is placed with the flat side toward cylinder head.

CAUTION

The ground faces of the mount flanges of the exhaust stacks are ground to fit without gaskets.

NOTE

Leaks caused by warped exhaust port flanges can be eliminated and stack alignment maintained by installing two exhaust port flange gaskets, P/N 73720, on each affected stack. Assemble gaskets with beads interlocking and install with flat side toward cylinder head and raised bead portion toward exhaust stack flanges.

d. Installation. (1) Position exhaust stacks on cylinders, coat threads of studs with antiseize compound (item 85 or 86, table 1-8). Place lockwasher on each stud and install nuts. Do not tighten nuts at this time.

(2) Install clamp connecting exhaust stacks together at lower end.

(3) Tighten nuts securing exhaust stacks to cylinders to a torque of 140 to 150 inch-pounds.

(4) Close engine cowling doors.

NOTE

After initial installation, retorquing exhaust flange nuts after 25 hours engine operation to adjust for permanent set of interlocking beads.

5-84. HEATER MUFF. (U-8D, U-8G, RU-8D)

5-85. The heater muff is installed around the exhaust stacks and provides heated alternate air for the carburetor.

a. Removal. (1) Remove clamp securing flexible air duct to heater muff and remove flexible air duct from heater muff.

(2) Remove exhaust stacks. (Refer to paragraph 5-82.)

(3) Remove bolt, washer, and nut securing heater muff to support bracket on engine mount.

(4) Remove heater muff from aircraft.

b. Cleaning. (1) Clean heater muff with dry cleaning solvent (item 6, table 1-8).

(2) Wipe heater muff dry with a clean dry cloth.

c. Inspection. (1) Inspect heater muff for cracks, dents, and hot spots.

(2) Inspect support bracket for cracks and malformed bolt holes.

d. Installation. (1) Position heater muff on engine mount support bracket and secure with bolt, washer, and nut.

(2) Install exhaust stacks. (Refer to paragraph 5-82.)

(3) Install flexible air duct to heater muff.

(4) Install clamp securing flexible air duct to heater muff.

5-86. AUGMENTER TUBES. (U-8D, U-8G, RU8D)

5-87. Two augmentor tubes are installed on each engine. Exhaust gases from the exhaust stack passing through the augmentor tubes induce air flow for improved engine cooling.

a. Removal. (1) Remove access panel of firewall on lower side of engine nacelle.

(2) Disconnect breather vent tube.

(3) Remove forward and aft clamps from augmentor tube.

(4) Slide augmentor tube out aft opening in engine nacelle.

b. Cleaning. (1) Clean augmentor tubes, wipe with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

CAUTION

Do not saturate insulation - liner has ventilation slots which allow porous action.

(2) Wipe with a clean dry cloth or allow to air dry.

(3) Remove caked carbon from liners with putty knife or coarse steel wool.

NOTE

Clean liner only adequate for inspection.

c. Inspection. (1) Inspect augmentor tubes for cracks, chafing, hot spots, and evidence of exhaust gas leaks.

(2) Inspect forward and aft clamps for cracks.

(3) Inspect liner for tears, holes, burned and security.

(4) Inspect insulation for condition and security. Replace if burned, torn or oil saturated.

d. Installation. (1) Slide augmentor tube into position through aft opening in engine nacelle.

(2) Install forward and aft clamps.

(3) Install breather vent tube.

(4) Install access panel aft of firewall on lower side of engine nacelle.

5-88. AUGMENTER TUBES. (U-8F)

5-89. Two augments tubes are installed on each engine. A two-stage augments tube is used on the U-8F aircraft to improve cooling airflow and reduce noise level.

a. Removal. (1) Remove access panel aft of firewall on lower side of engine nacelle.

(2) Remove clamps supporting breather vent tube inside augments tube.

(3) Remove clamps from forward and aft ends of second stage augments tube.

(4) Slide second stage augments tube out aft opening in engine nacelle.

(5) Remove screws securing first stage augments tube to support bracket.

(6) Remove first stage augments tube from exhaust stacks.

b. Cleaning. (1) Clean augments tubes with dry

cleaning solvent (item 6, table 1-8).

(2) Wipe augments tubes dry with a clean, dry cloth.

c. Inspection. (1) Inspect augments tubes for cracks, chafing, hot spots, and evidence of exhaust gas leaks.

(2) Inspect forward and aft clamps for cracks.

(3) Inspect support bracket for cracks.

d. Installation. (1) Position first stage augments tube over exhaust stacks.

(2) Install screws securing first stage augments tube to support bracket.

(3) Position second stage augments tube over first stage augments tube.

(4) Install clamps on forward and aft ends of second stage augments tube.

(5) Install clamps supporting breather vent tube inside augments tube.

(6) Install access panel aft of firewall on lower side of engine nacelle.

SECTION V. FUEL SYSTEM**5-90. DESCRIPTION.**

5-91. The fuel system for U-8 aircraft consists of two independent fuel systems that will supply fuel to either engine. (See Figure 5-19, 5-20, and 5-22.) Each fuel system consists of one main and three auxiliary fuel cells, two submerged electrical fuel

boost pumps, a manual fuel selector valve and strainer assembly, engine driven fuel pump, and a fuel filter. Both fuel systems are controlled from the fuel control panel located on the left side of the flight compartment. (See Figure 5-23 and 5-24.) For troubleshooting the fuel system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Engine fails to start.	Primer solenoid valve inoperative.	Disconnect primer line at primer solenoid valve and energize primer solenoid valve. If fuel does not flow from primer line, check fuel lines for leaks or obstructions. If there are no leaks or obstructions, replace primer solenoid valve. (Refer to paragraph 5-116.)
	Insufficient fuel pressure.	Adjust engine driven fuel pump. (Refer to paragraph 5-112.)
	Vapor in fuel system.	Operate fuel booster pump, allowing vapor to vent from fuel system lines.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Engine idles improperly	Incorrect idle mixture adjustment (U-8D, U-8G, and RU-8D).	Adjust idle mixture (Refer to paragraph 5-177.)
	Incorrect idle mixture adjustment (U-8F).	Notify direct support maintenance unit.
	Primer solenoid valve leaking.	Replace primer solenoid valve. (Refer to paragraph 116.)
	Water in fuel.	Drain and replenish fuel supply. (Refer to paragraph 1-20 and 1-123.)
Engine runs rough.	Faulty carburetor (U-8D, U-8G, and RU-8D).	Replace carburetor. (Refer to paragraph 5-177.)
Faulty fuel injector pump.		Replace fuel injector pump. (Refer to paragraph 5-181.)
Primer solenoid valve inoperative.		Replace primer solenoid valve. (Refer to paragraph 5-116.)
Engine backfires.	Idle mixture too lean (U-8D, U-8G, and RU-8D).	Adjust idle mixture. (Refer to paragraph 5-177.)
	Fuel injector pump improperly adjusted (U-8F).	Notify direct support maintenance unit.

5-91A. NACELLE INTERIOR FIRE SHIELDS.

5-91B. Fire shields are installed around the exhaust pipes in lower engine compartment. These shields are made from 1/8 inch thick neoprene-coated asbestos sheet and bonded to the interior of the augmentor cavity structure with adhesive (EC 1357) (item 92, table 1-8). Screws are added for additional security. These shields are installed to prevent the spread of an in-flight engine fire from penetrating critical areas of the wing and nacelle, allowing the pilot more time to take emergency measures necessary for a safe landing.

a. Removal. Fire shields are a permanent installation and are not normally removed. When it becomes necessary to remove them, use the following procedure:

- (1) Remove augmentor tube.
- (2) Remove screws, washers and nuts from fire shields.
- (3) Using toluene (item 73, table 1-8) loosen adhesive (EC 1357) that holds fire shields to nacelle and remove shields.

b. Cleaning. (1) Clean fire shields with dry cleaning solvent (item 6, table 1-8).

- (2) Wipe fire shields dry with clean, dry cloth.

c. Inspection. (1) Inspect fire shields for cuts, tears and holes.

(2) Inspect fire shields for loose adhesive and missing screws.

d. Installation. (1) When a good fit is assured on the shield being installed, apply adhesive (EC 1357) (item 92, table 1-8) around edges of the fire shield, approximately 1.5 inches wide and sparingly across the entire cementing surface.

(2) Apply a thin even coat of adhesive by brush to each surface to be bonded.

(3) Allow adhesive to cure until it is quite tacky, but will not transfer to the knuckle when touched.

(4) Place fire shield in position and press mating surfaces firmly together.

(5) Install screws, washers and nuts, as required, to hold shields in place, in addition to bonding.

5-92. FUEL VENT SYSTEM.

5-93. The auxiliary fuel cells (outboard cells) are vented to the outboard side of the nacelle and forward of the leading edge of the wing. The main fuel cell is vented to the trailing edge of the

inboard center section of the wing. (See figures 5-21 and 5-22.) Should fuel vent lines become obstructed, pinched, or distorted, a negative pressure is created in the fuel cell caused by fuel consumption, thus resulting in fuel cells collapsing; or, as a result of a wing-down position and fuel sloshing, the fuel vent line may become filled with fuel and start a siphoning action. The exposed portions of fuel vent lines are bent slightly forward to create positive pressure in fuel cells and to prevent siphoning action when aircraft is in flight. Inspect the fuel vent system as follows:

- a. Inspect fuel vent lines to ensure they are not pinched, distorted or obstructed.
- b. Inspect fuel vent lines for security of mounting.

5-94. SIPHON BREAK CHECK VALVE.

5-95. To equalize any change in air pressure differential and a possible siphoning action, a siphon break check valve is provided which incorporates a siphon break line. Break check valve is installed in the main and auxiliary vent lines outboard of the fuel cells. Negative air pressure will unseat the siphon break check valve and allow air to enter the fuel cell through the siphon break check valve and allow air to enter the fuel cell through the fuel vent line, stopping the siphoning action. As soon as siphoning action

is stopped, the siphon break check valve will seat and allow the fuel vent line to return to normal function.

a. Removal. Auxiliary Tank Siphon Break Check Valve. (1) Remove wing access panel over siphon break check valve.

(2) Disconnect fuel vent lines from fittings on each end of siphon break check valve.

(3) Remove siphon break check valve.

b. Removal. Main Tank Siphon Break Check Valve. (1) Locate siphon break check valve in upper rear section of wheelwell.

(2) Disconnect fuel vent lines from fitting on each end of siphon break check valve.

(3) Remove siphon break check valve.

c. Installation. (1) Install siphon break check valve (total of 4) in position with flow arrow stamped on barrel of valve pointing toward the fuel cell.

NOTE

To ensure proper siphon break action, check each siphon break check valve after installation is completed to ensure the word hinge is positioned on top of valve.

(2) Connect fuel vent lines to fittings on each end of siphon break check valve.

(3) Install wing access panel over siphon break check valve.

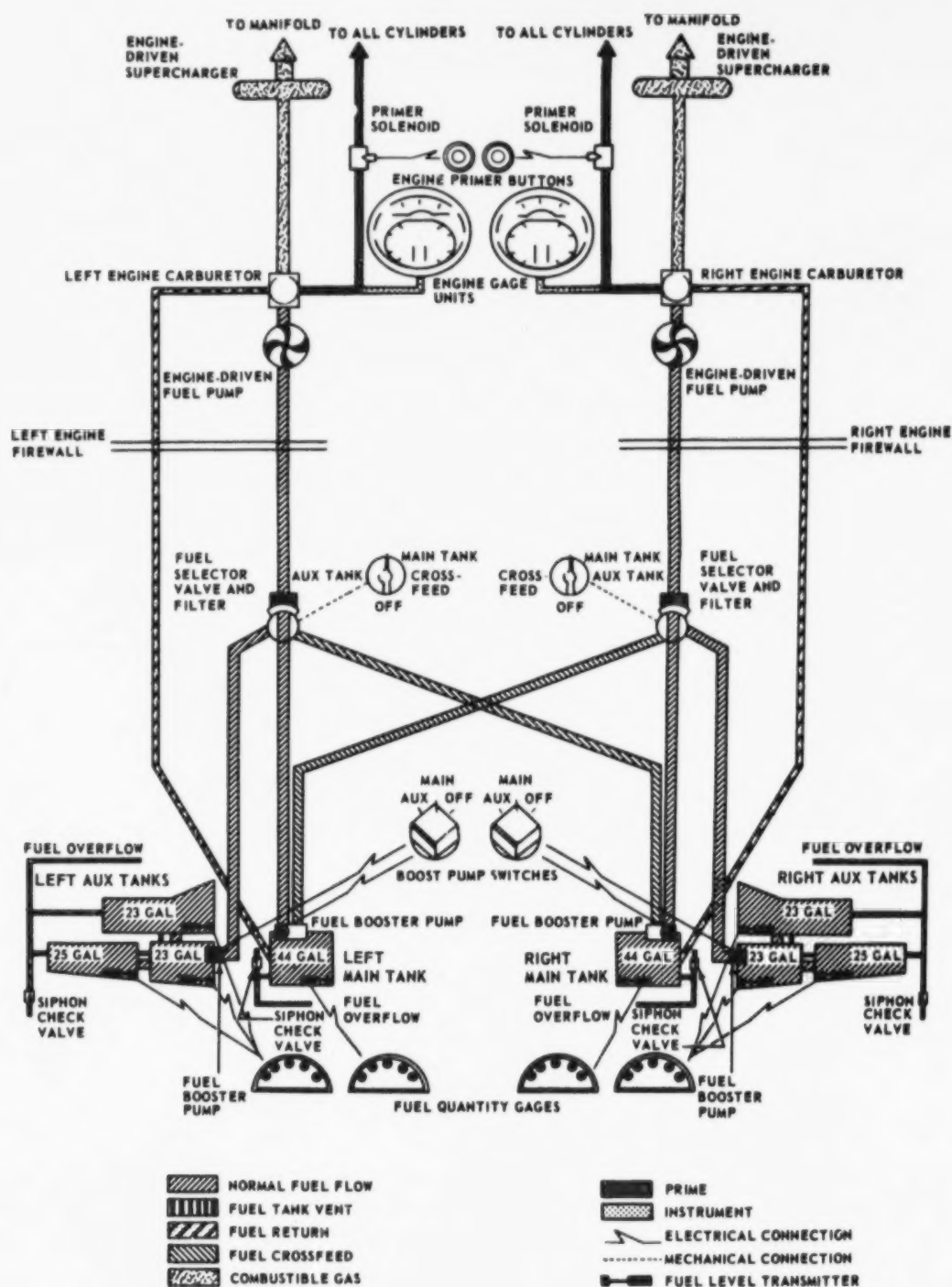


Figure 5-19. Fuel system schematic (U-8D, U-8G, and RU-8D)

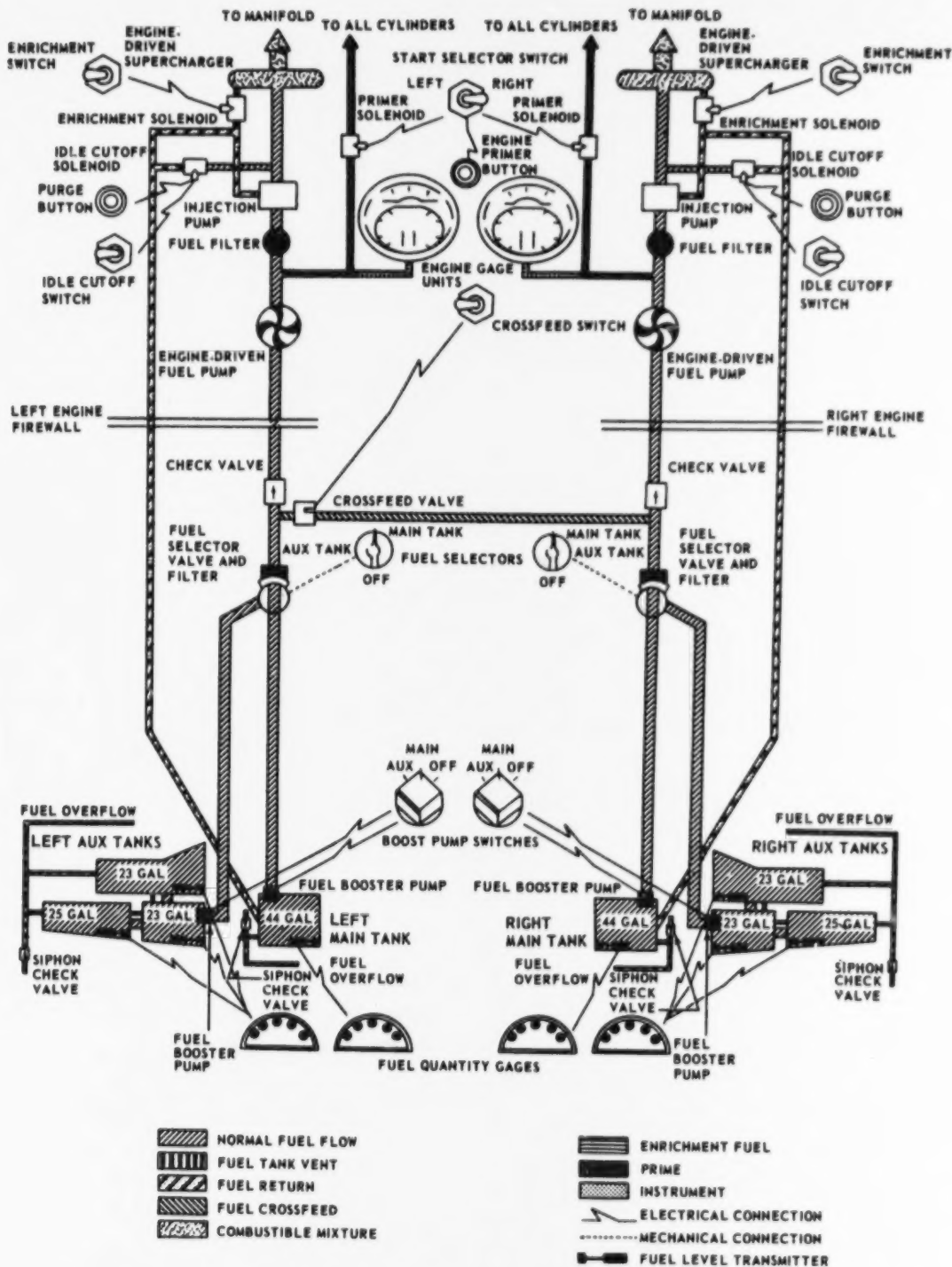


Figure 5-20. Fuel system schematic (U-8F)

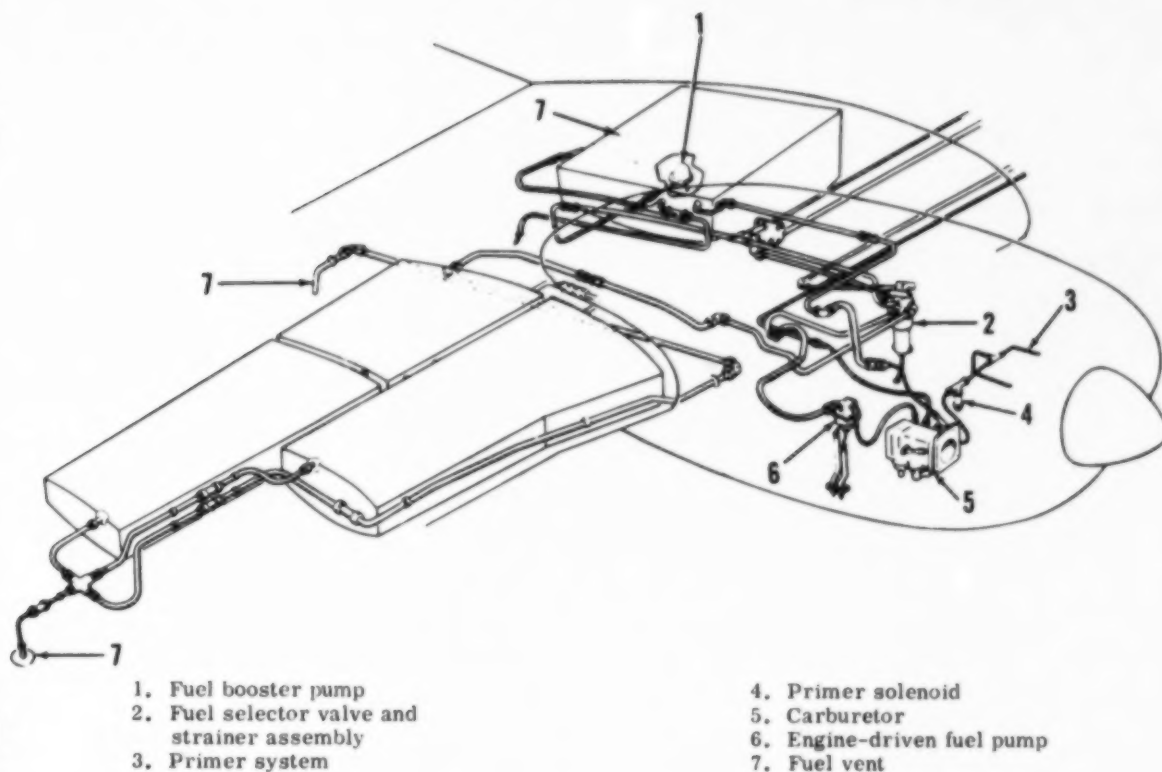


Figure 5-21. Fuel system installation (U-8D, U-8G, and RU-8D)

5-96. FUEL CELLS.

5-97. The fuel system has one main and three auxiliary fuel cells in each system. (See figures 5-21 and 5-22.) The main fuel cells are located in the wing center section and have a total capacity of 44 gallons. The auxiliary fuel cells are located in the outboard wing panels; one in the leading edge and two between the forward and rear spars outboard of the engine nacelle. The auxiliary fuel cells in each system function as one fuel cell and have a combined total capacity of 71 gallons. The auxiliary fuel cells are interconnected and drain simultaneously through a single drain.

- a. Servicing. Fill fuel cells. (Refer to paragraph 1-123).
- b. Inspection. (1) Inspect fuel lines and hoses for leakage, chafing, cracks, and security.
- (2) Inspect fuel cells for damage in radii and fitting areas.
- (3) Inspect the fuel cells for deterioration and

possible cracks or seepage, particularly around vent drain outlet and interconnect nipples. If seepage is evident, drain the fuel cells, and inspect the interior of each cell where seepage is suspected for cracking, porosity or other signs of deterioration.

(4) Ascertain that the cell retaining fasteners are properly positioned and fastened.

(5) Interconnect nipples that are not hard or cracked should be checked by scraping with a fingernail. If the rubber has not degraded, the fingernail will glide across the rubber without damage. If material can be scraped off or the fingernail digs into the rubber, the cell should be replaced.

NOTE

Bladder type fuel cells in service for extended periods may become hard and brittle. These cells should be checked carefully. The inspection itself could cause cracks in the material which in turn could cause fuel seepage.

(6) Fuel cells that have become hardened and are not pliable should be replaced. Repair is not recommended since the handling of such cells is likely to result in cracking the hardened cell material. Fuel cells that are pliable and not hardened may be repaired in accordance with TM 55-1510-201-35, chapter 5, section 5.

c. Standpipe Inspection (Goodyear BTC-39 cells only)

(1) Remove the fuel filler cap fuel quantity transmitter or an access cover to each fuel cell to examine the attachment ring. Goodyear fuel cells

have one cast aluminum nutplate ring bonded on the inside surface of cell. A Uniroyal fuel cell has two machined steel rings with cell wall secured between them (see figure 5-21A).

NOTE

Goodyear BTC-39 construction type fuel cells removed from the airplane for any reason **MUST BE REPLACED AND NOT BE REPAIRED OR REINSTALLED.**

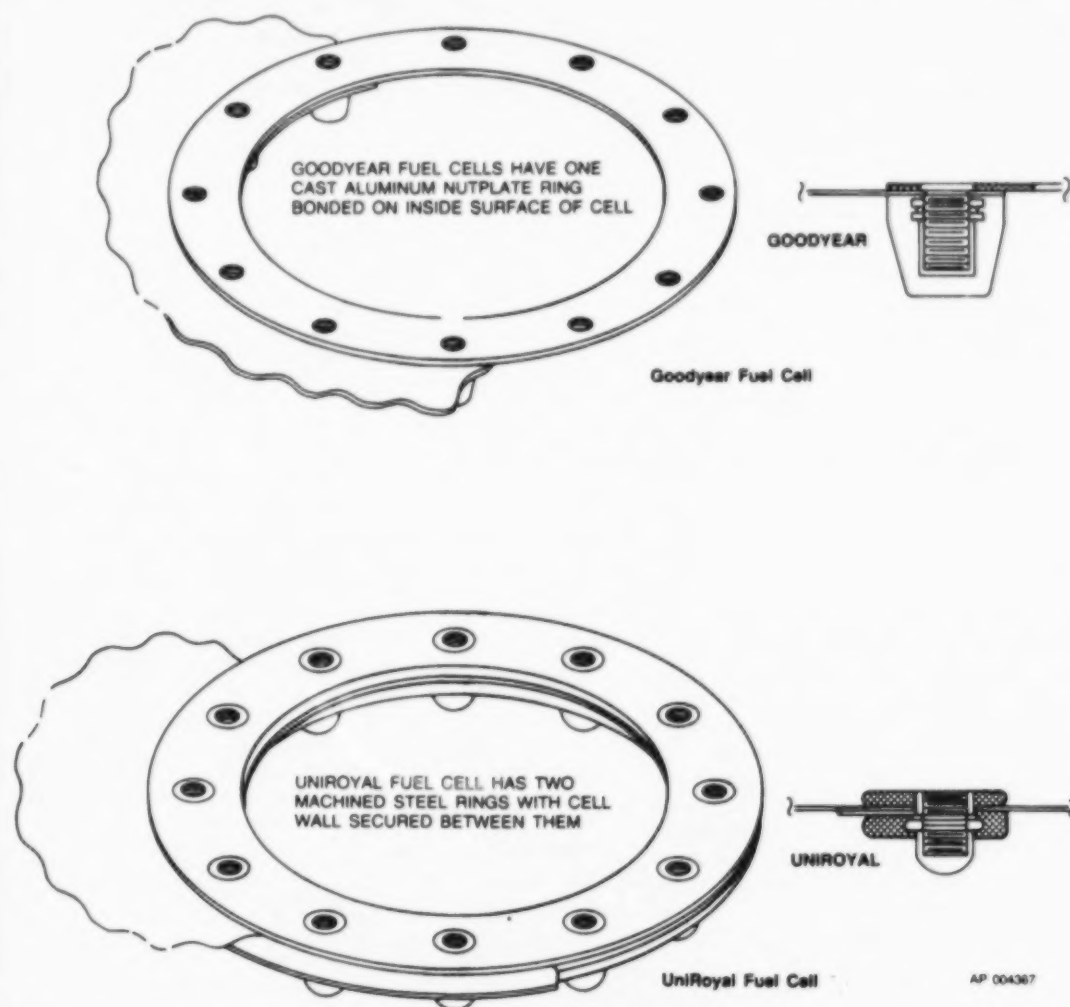


Figure 5-21A Fuel Cell Attachment Rings

(2) If the cell is made by Uniroyal or is not Goodyear BTC-39 construction, no further inspection is required. Install access cover, cap or fuel quantity transmitter. If any or all fuel cells are of Goodyear BTC-39 construction series or are of unknown manufacturer or construction, the following test and inspection is to be performed.

(3) Examine the lower surface of the wings and nacelles for signs of fuel stains, particularly around vents, fuel outlets, drain and interconnect nipples.

(4) Drill and tap a 7/16 inch 20 UNF threaded hole in the top of a standard fuel cap. Assemble the fuel cap standpipe assembly as shown in figure 5-21B.

(5) Fill the fuel system with fuel.

(6) Install the fuel cap standpipe assembly on one wing.

(7) Turn the fuel selector valve OFF.

(8) Plug all pressure relief vents and recessed vents on one wing.

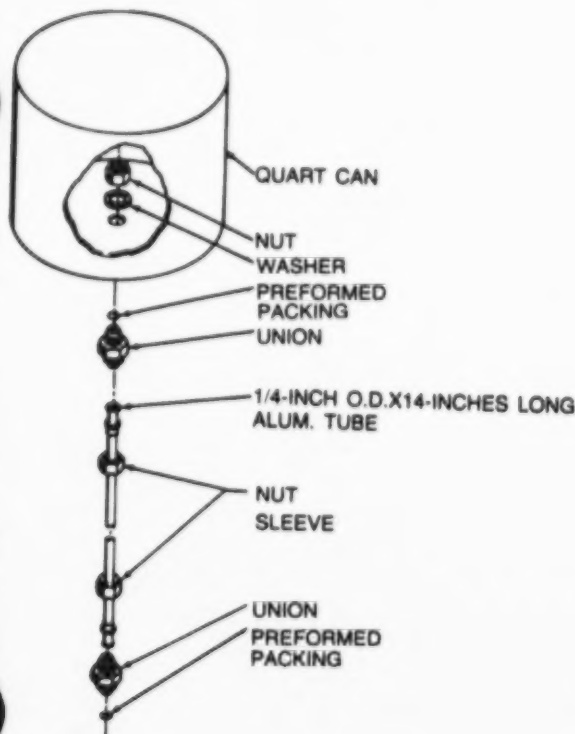


Figure 5-21B

Fuel Cap Standpipe Assembly

NOTE

The three auxiliary tanks are interconnected and will be tested simultaneously. The main tank will be tested individually.

(9) Fill the standpipe assembly with fuel. Continue filling until the fuel system stabilizes.

(10) After stabilizing, the fuel level in the standpipe must remain constant for not less than 15 minutes (A scribe mark on the inner surface of the standpipe can will help reference to a constant level.).

(11) Repeat steps 6 through 10 on all fuel tanks.

(12) If no evidence of fuel seepage or leaking is apparent during the above test, no further action is required. If seepage or leaking is indicated in the above test, proceed as follows:

a. Isolate the source of the leak.

b. Drain and purge the fuel system as required to make necessary repairs.

c. If it is determined that a fuel cell is leaking, visually inspect the interior of each fuel cell for possible cracking, peeling or other signs of deterioration.

d. Determine that all fuel cell retaining fasteners are properly positioned and secured.

e. Inspect all internal and external nipples by scraping with a fingernail. If the compound on the nipple fitting has deteriorated, the fingernail will dig in and the compound will have a consistency similar to art gum. If no deterioration exists, the fingernail will glide across the surface without damage to the compound.

(13) Any fuel cell found seeping or with deteriorated nipples must be removed and replaced.

CAUTION

Goodyear BTC-39 construction cells removed for above condition must be replaced with new fuel cells and must not be repaired or installed in the aircraft.

5-98. FUEL QUANTITY TRANSMITTER

5-99. The fuel quantity transmitter consists of a potentiometer with a mechanically linked arm

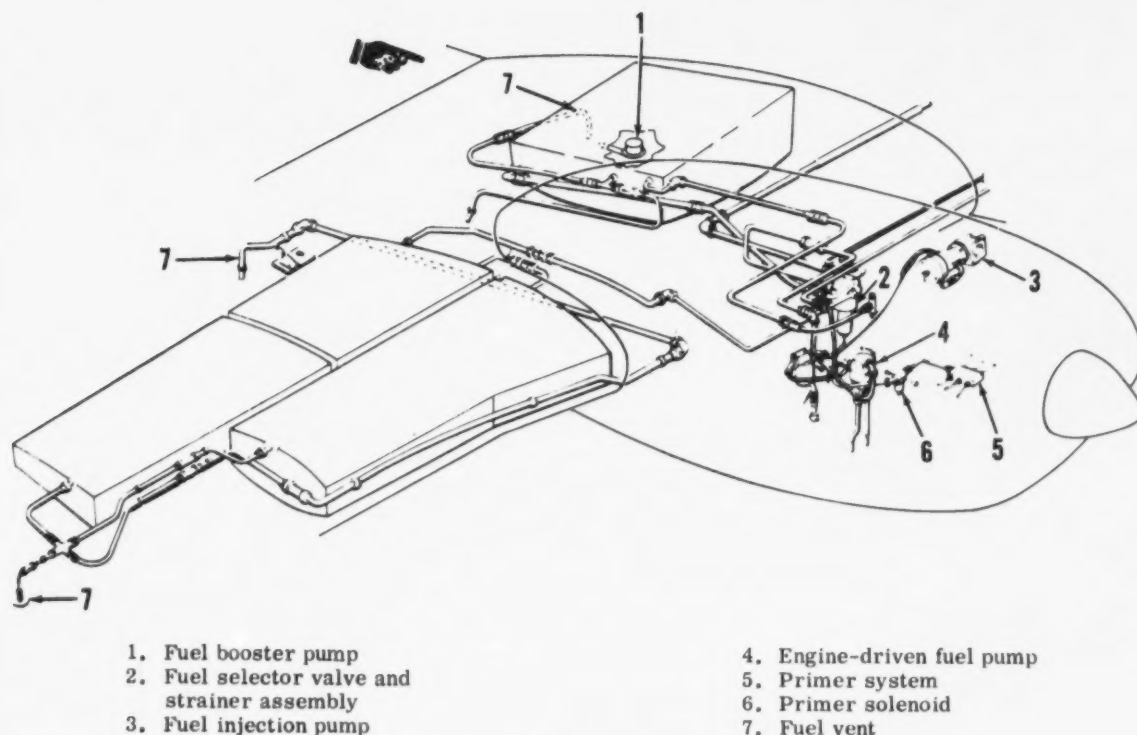


Figure 5-22. Fuel system installation (U-8F)

that is actuated by a float attached to the arm. As the arm and float move with the fuel level, the fuel quantity indicator shows a corresponding reading.

a. Removal. (1) Place battery master switch in OFF position.

(2) Disconnect one battery lead to eliminate possibility of electricity reaching the fuel quantity transmitter.

(3) Drain fuel cell. (Refer to paragraph 1-128.)

CAUTION

Ensure aircraft is properly grounded and necessary personnel and fire extinguishers are available prior to draining fuel cell.

(4) Remove fuel quantity transmitter access panel from top of fuel cell.

(5) Disconnect electrical connections from fuel quantity transmitter. Mark connections to ensure proper installation.

(6) Remove screws securing fuel quantity transmitter to fuel cell.

(7) Remove fuel quantity transmitter and gasket from fuel cell.

CAUTION

Avoid bending float arm when removing fuel quantity transmitter.

b. Cleaning. (1) Clean mounting surface of fuel cell and fuel quantity transmitter with a clean, dry cloth.

(2) Clean electrical connections with a clean, dry cloth.

c. Inspection. (1) Inspect float arm for distortion.

(2) Inspect protective finish of float for flaking and cracks.

(3) Inspect electrical connections for distortion and corrosion.

d. Installation. (1) Install new gasket on fuel quantity transmitter and install transmitter in fuel cell.

(2) Ensure that float is free to touch top and bottom of fuel cell. If restricted, bend float arm to obtain required action.

(3) Install screws securing fuel quantity transmitter to fuel cell. Tighten screws to a torque of 25 inch-pounds.

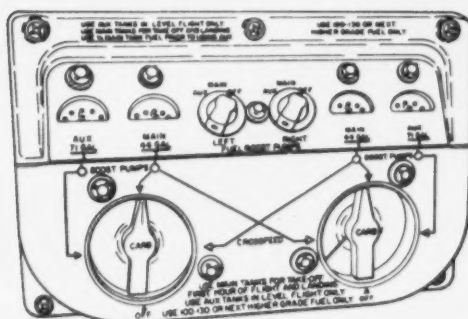


Figure 5-23. Fuel control panel (U-8D, U-8G, and RU-8D)

- (4) Secure screws with lock wire.
- (5) Connect electrical connections to fuel quantity transmitter.
- (6) Install fuel quantity transmitter access panel on top of fuel cell.
- (7) Install battery lead to battery.
- (8) Test fuel quantity transmitter. (Refer to step e.)

e. Testing. (1) Place battery switch in ON position.

(2) With float resting on bottom of fuel cell, check fuel quantity indicator for empty reading.

(3) Place battery switch in OFF position.

(4) Fill fuel cells. (Refer to paragraph 1-123.)

(5) Apply a source of auxiliary power of 28 to 28.5 volts to aircraft. Check fuel quantity indicators for full reading.

NOTE

For maximum accuracy of fuel quantity indicators in flight, it is essential that 28 to 28.5 volts be used when testing fuel quantity transmitters.

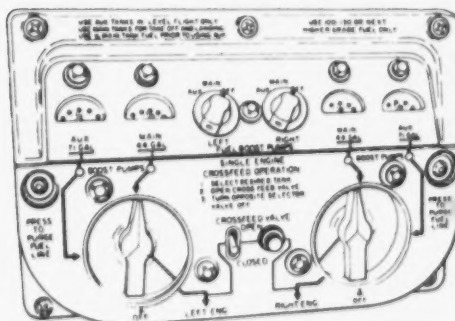


Figure 5-24. Fuel control panel (U-8F)

f. Adjustment. (1) Remove screws attaching fuel control panel.

(2) Adjust each of the four potentiometers on back side of fuel control panel to obtain maximum resistance by loosening locknut on end of shaft housing and turning slotted shaft counter-clockwise (as viewed from back side) to limit of its travel.

(3) Apply 28 to 28.5 volts to aircraft main bus distribution system, either by running an engine above generator cut-in speed or by using external power.

NOTE

For maximum accuracy of fuel quantity indicators in flight, it is essential that the full voltage flight condition be simulated as in step (c) above.

(4) Check all fuel quantity indicators at this point. They should read approximately 1/2 to 3/4 full.

(5) Readjust the four potentiometers by slowly turning each shaft in a clockwise direction until its corresponding indicator indicates full.

(6) Tighten locknut on each shaft to maintain calibrated position.

(7) Shut down engine or disconnect external power source, leaving only battery power connected to bus system. With voltage reduced to approximately 24 volts, fuel quantity indicators will show a corresponding drop. This change in indication is normal and no attempt should be made to correct it.

5-100. FUEL BOOST PUMPS.

5-101. Four submerged fuel boost pumps in the aircraft fuel system supply vapor-free fuel to the system in case of engine-driven fuel pump failure. The motor-driven fuel boost pumps are reaction turbine-type pumps rated at 300 pph. They are located in the bottom of each main fuel cell and each aft inboard auxiliary fuel cell. Fuel boost pump switches on the fuel selector panel control the pumps. Each fuel boost pump has a fuel cell drain, a discharge line through which fuel is pumped, and a pump seal drain. On U-8D, U-8G, and RU-8D aircraft, a line connected to the fuel cell drain fitting on the right-hand fuel boost pump supplies fuel to the aircraft heater.

a. Removal. (1) Place battery and fuel boost pump switches in OFF position.

(2) Remove access covers from underside of

each wing.

(3) Drain fuel cell. (Refer to paragraph 1-128.)

(4) Disconnect fuel lines from fuel booster pump.

(5) Disconnect electrical leads from terminal block.

(6) Cut lockwire and remove bolts securing fuel booster pump (1, figure 5-21 or 5-22) to fuel cell.

(7) Remove fuel booster pump and gaskets from fuel cell.

b. Cleaning. (1) Clean any foreign matter from fuel booster pump screen.

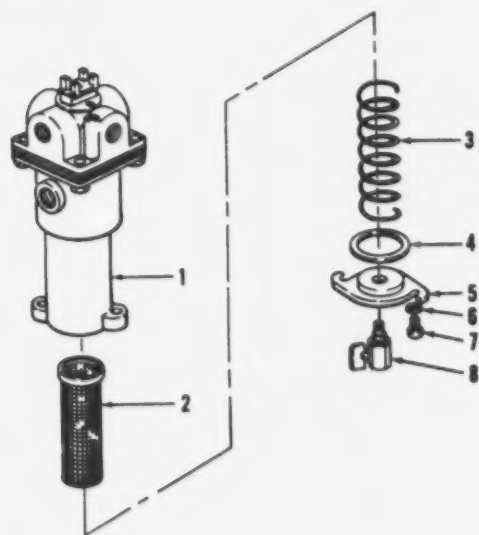
(2) Clean any obstruction from seal drain line.

c. Inspection. (1) Inspect fuel booster pump screen for security, breaks, and distortion.

(2) Inspect electrical leads for chaffing and condition of insulation.

d. Installation. (1) Position fuel booster pump on fuel cell with a gasket between fuel cell and fuel booster pump mounting structure and between fuel booster pump mounting structure and fuel booster pump.

(2) Install bolts securing fuel booster pump to fuel cell.



- 1. Fuel selector valve
- 2. Fuel strainer
- 3. Spring
- 4. Gasket

- 5. Cap
- 6. Washer
- 7. Screw
- 8. Drain valve

Figure 5-25. Fuel selector valve and strainer assembly

NOTE

Installation of fuel booster pump can be simplified by the use of two headless bolts for aligning purpose. Insure headless bolts are removed and mounting bolts are installed after installation of other mounting bolts.

(3) Tighten bolts to a torque of 35 inch-pounds. Secure bolts with lockwire.

(4) Apply thread compound (item 44, table 1-8) to fittings and install fuel lines.

(5) Connect electrical leads to terminal block.

(6) Fill fuel cells. (Refer to paragraph 1-127.)

(7) Check fuel booster pump for leakage and operation. (Refer to step e.)

(8) Install access covers.

e. Maintenance operational check. (1) Apply power to aircraft.

(2) Place fuel selector handle to MAIN position.

(3) Place fuel boost pump switch in ON position.

(4) With fuel booster pump operating, fuel pressure gage should read 10-1/2 psi.

(5) Repeat steps (2) through (4) above for auxiliary fuel cells.

(6) Place fuel boost pump switch in OFF position.

(7) Disconnect power from aircraft.

5-102. FUEL SELECTOR VALVE AND STRAINER ASSEMBLY. (U-8D, U-8G, RU-8D)

5-103. The fuel selector valve (1, figure 5-25) is controlled from the fuel control panel on the left side of the pilot's compartment through a series of control cables. Each fuel selector has four positions: MAIN, AUX, CROSSFEED, and OFF. Positioning the selector to MAIN or AUX permits movement of fuel from the corresponding tank to the engine. Positioning the selector to CROSSFEED permits crossfeed of fuel from the main tanks only. Turning the selector to the OFF position shuts off all fuel to the engine. The selector valves are located behind the firewall of each respective engine.

a. Removal. (1) Place fuel selector handle on pilot's fuel control panel in OFF position.

NOTE

It is recommended that fuel cells be drained prior to removing fuel selector valve to prevent loss of fuel. If fuel cells are not drained, plug fuel lines.

- (2) Remove canvas protection boot.
- (3) Disconnect fuel lines from fuel selector valve.

NOTE

Fuel selector valve may be removed with out disturbing fuel selector valve cable rigging.

- (4) Remove drive pin from driver.
- (5) Remove bolts securing mounting plate to mounting support on firewall.
- (6) Remove fuel selector valve.
- b. Cleaning. Remove fuel strainer and clean. (Refer to paragraph 5-106.)
- c. Inspection. (1) Inspect fuel selector valve for evidence of leakage.
- (2) Inspect driver and drive pin for wear.
- (3) Inspect fuel strainer. (Refer to paragraph 5-106).
- d. Installation. (1) Position fuel selector valve shaft so that arrow on end of shaft points to

plugged outlet.

- (2) Place fuel selector handle on pilot's fuel control panel in OFF position.
- (3) Position fuel selector valve on mounting support and secure to mounting plate with bolts.
- (4) Install drive pin in driver.
- (5) Operate fuel selector handle to ensure that fuel selector valve engages completely and there is no binding in fuel selector valve or linkage.
- (6) Connect fuel lines to fuel selector valve.
- (7) Install canvas protection boot.

e. Maintenance Operational Check. Procedure given is for left valve; to check right valve substitute right for left or vice versa in each step.

- (1) Ensure fuel cells are serviced with fuel.

- (2) Place battery switches in ON position.
- (3) Place left fuel selector handle in OFF position.
- (4) Place left boost pump switch in ON positions. No pressure should be indicated on either fuel pressure gage. Place left boost pump switch in OFF position.
- (5) Place left fuel selector handle in MAIN position and right fuel selector handle in OFF position.

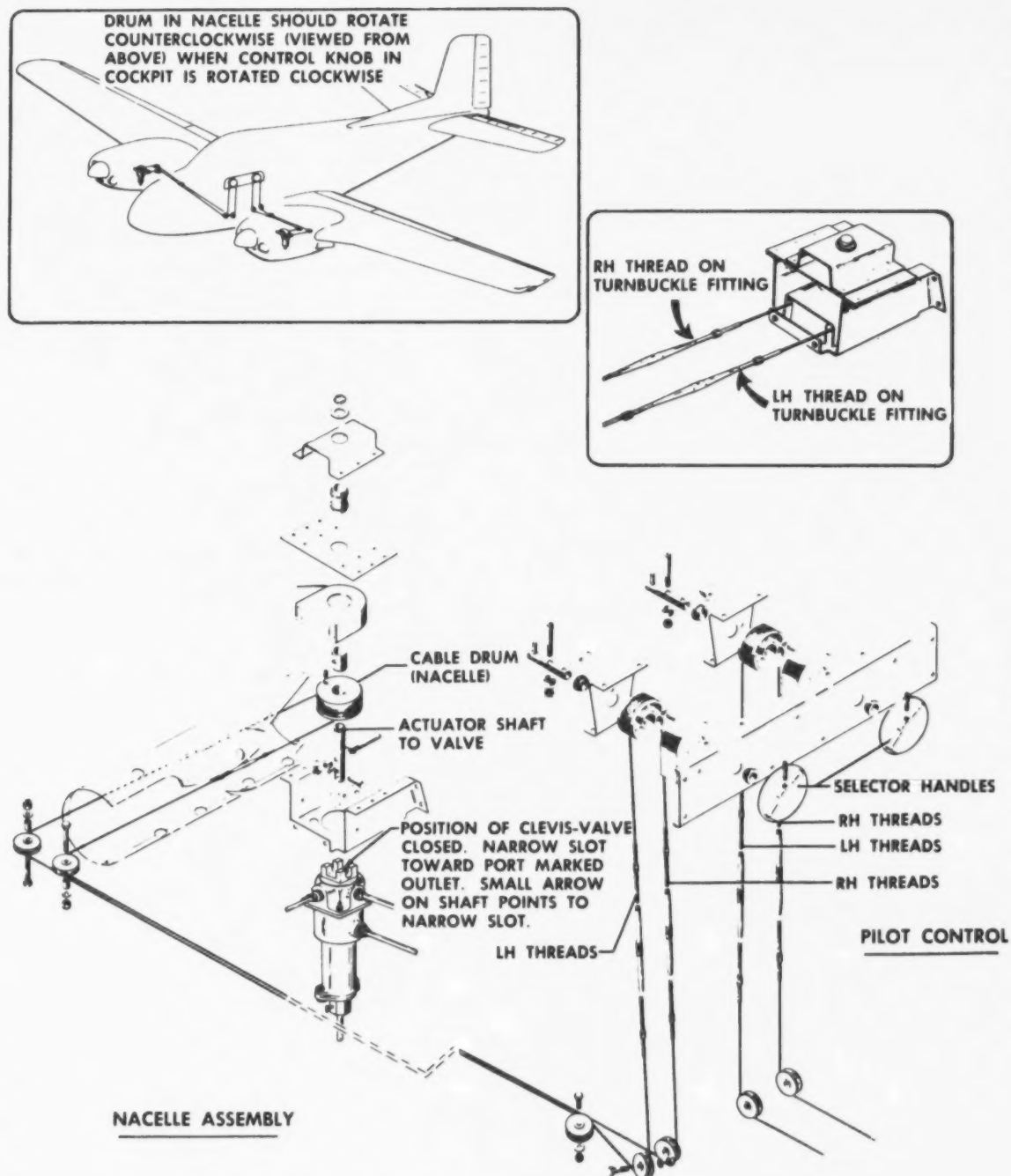


Figure 5-25A. Fuel Selector Valve Cables.

(6) Place left main boost pump switch in ON position. Fuel pressure should be indicated on left fuel pressure gage. Place boost pump switch in OFF position.

(7) Place left selector on CROSSFEED and right selector on MAIN.

(8) Place right main boost pump switch in ON position. Fuel pressure should be indicated on both fuel pressure gages.

(9) Start left engine in accordance with TM 55-1510-201-10.

(10) Place left selector in AUX position. Run engine at 1000 rpm for several minutes to ensure that fuel is being drawn for left auxiliary cell.

(11) Stop engine in accordance with TM 55-1510-201-10.

f. Rigging. (1) Place fuel selector handle in flight compartment in OFF position. (See figure 5-25A.)

(2) Place fuel selector valve in nacelle in OFF position.

NOTE

This position can be readily determined by noting the position of the clevis. The narrow slot of clevis must be toward port which is marked OUTLET. Small arrow on the shaft points to the narrow slot.

(3) Remove upholstery panel under fuel selector panel.

(4) Rig control cables to a tension of 10 pounds, plus or minus 2 pounds.

(5) After rigging, check to be sure that selector handle and selector valve positions correspond when turned to each tank. When selector handle in pilot's compartment is rotated clockwise, cable drum in nacelle should rotate counterclockwise (viewed from above).

5-104. FUEL SELECTOR VALVE AND STRAINER ASSEMBLY. (U-8F)

5-105. The fuel selector valve (1, figure 5-25) is controlled from the fuel control panel on the left side of the pilot's compartment through a series of control cables. Each fuel selector valve has three positions: MAIN, AUX, and OFF. Each fuel selector valve can route fuel from main fuel cells or auxiliary fuel cells, or it will shut off fuel flow from both sources. The fuel selector valves are located in each main gear wheel on the aft side of the firewall. A fuel strainer (2, figure 5-25) is incorporated in the lower part of each fuel selector valve.

When properly positioned, the fuel selector valves serve as a crossfeed system.

NOTE

During crossfeed operation, the fuel selector valves must be set in either MAIN or AUX position.

a. Removal. Refer to paragraph 5-102.
b. Cleaning. Refer to paragraph 5-102.
c. Inspection. Refer to paragraph 5-102.
d. Installation. Refer to paragraph 5-102.
e. Maintenance Operational Check. (1) Ensure fuel cells are serviced with fuel.

(2) Place battery switches in ON position.

(3) Place left fuel selector handle in OFF position.

(4) Place left boost pump switch in ON position. No pressure should be indicated on either fuel pressure gage. Place left boost pump switch in OFF position.

(5) Place left fuel selector handle in MAIN position and right fuel selector handle in OFF position.

(6) Place left main boost pump switch in ON position. Fuel pressure should be indicated on left fuel pressure gage. Place boost pump switch in OFF position.

(7) Place right selector on MAIN. Place crossfeed valve switch in OPEN position.

(8) Place right main boost pump switch in ON position. Fuel pressure should be indicated on both fuel pressure gages.

(9) Start left engine in accordance with TM 55-1510-201-10.

(10) Place left selector in AUX position. Run engine at 1000 rpm for several minutes to ensure that fuel is being drawn from left auxiliary cell.

(11) Stop engine in accordance with TM 55-1510-201-10.

f. Rigging. Refer to paragraph 5-102.

5-106. FUEL STRAINER.

5-107. The fuel strainer (2, figure 5-25) is an integral part of the fuel selector valve located in the main wheel well on the aft side of the firewall. The fuel strainer collects water and other foreign matter from the fuel as it passes through the fuel selector valve.

a. Removal. (1) Place fuel selector handle in OFF position.

(2) Loosen screws (7, figure 5-25) securing cap (5) to bottom of fuel selector valve (1).

(3) Turn cap (5) one-quarter turn and remove cap from fuel selector valve (1).

(4) Remove gasket (4), spring (3), and fuel strainer (2) from fuel selector valve (1).

b. Cleaning. (1) Clean fuel strainer with dry cleaning solvent (item 6, table 1-8).

(2) Blow fuel strainer dry with filtered, compressed air.

c. Inspection. (1) Inspect fuel strainer for dents, tears, clogging, and separation of solder joints.

(2) Inspect body and cap for cracks.

(3) Inspect for malformed threads.

d. Installation. (1) Install fuel strainer (2, figure 5-25), spring (3), gasket (4), and cap (5) in the order listed.

NOTE

Fuel strainer must be installed with flanged end UP and secured in fuel selector valve by spring tension in order to perpetuate filtering action.

(2) Rotate cap (5) until screws (7) are in slots of cap. Tighten screws.

5-108. CROSSFEED VALVE. (U-8F)

5-109. The crossfeed valve is an electrically operated gate valve located on the forward right side of the left wheel well. It is controlled by a toggle switch located on the fuel control panel in the pilot's compartment. Crossfeed on fuel on U-8F aircraft is accomplished by placing fuel selector handle in either MAIN or AUX position and placing CROSSFEED VALVE switch in OPEN position.

a. Removal. (1) Place fuel selector handles in OFF position.

(2) Disconnect electrical connector from motor of crossfeed valve.

(3) Remove fuel lines from crossfeed valve.

(4) Remove screws securing crossfeed valve to support bracket.

(5) Remove crossfeed valve.

b. Cleaning. Clean crossfeed valve with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect crossfeed valve for evidence of fuel leaks.

(2) Inspect body for dents, cracks, and malformed bolt holes.

(3) Inspect motor for security of mounting to body.

d. Installation. (1) Position crossfeed valve on support bracket and install screws securing crossfeed valve to support bracket.

(2) Apply thread compound (item 44, table 1-8) to threads of fittings on crossfeed valve.

(3) Install fuel lines on crossfeed valve.

(4) Connect electrical connector to motor of crossfeed valve.

(5) Check crossfeed valve for operation and leaks. (Refer to steps c and e.)

e. Maintenance Operational Check. (1) Place left and right fuel selector handles in MAIN position.

(2) Start left engine in accordance with TM 55-1510-201-10.

(3) Place crossfeed valve switch in OPEN position.

(4) Place left fuel selector handle in OFF position and operate engine a few minutes to ensure crossfeed valve is operating properly.

(5) Stop engine in accordance with TM 55-1510-201-10.

(6) Place crossfeed valve switch in CLOSED position.

(7) Place left and right fuel selector handles in OFF position.

5-110. FUEL FILTER. (U-8F)

5-111. The fuel filter filters fuel of foreign matter before it enters the fuel injection pump. The fuel filter utilizes two types of filter elements, pleated and filter pack. The fuel filter is located on the engine firewall.

a. Removal. (1) Remove drain valve from fuel filter.

(2) Remove fuel hoses from fuel filter.

(3) Remove bolts and washers securing fuel filter to engine firewall and remove fuel filter.

b. Cleaning. Cleaning of fuel filter is accomplished by a primary cleaning and ultrasonic cleaning, or a secondary cleaning if ultrasonic cleaning is not available. The secondary cleaning will be the final cleaning when used. If necessary, repeat secondary or ultrasonic cleaning. For fuel filter cleaning materials refer to table 5-1.

WARNING

Cleaners used in cleaning fuel filters are toxic. Avoid breathing vapors and contact with skin. Provide adequate ventilation and protective clothing.

(1) Primary Cleaning. (a) Remove acorn nut securing bowl to fuel filter.

(b) Remove bowl, gasket, and pleated filter elements.

Table 5-1. Fuel filter cleaning

CLEANERS	PRIMARY CLEANING	*SECONDARY CLEANING	*ULTRASONIC CLEANING
AGISOLV 14 Branson Company (Item 54, Table 1-8)	X		
Dry Cleaning Solvent (Item 6, Table 1-8)		X	
Trichloroethylene (Item 67, Table 1-8)		X	X
Tetrachloroethylene (O-T-236) (Item 68, Table 1-8)		X	X
Freon Gas (Item 69, Table 1-8)			X
*Use as available, preferably ultrasonic cleaning.			

NOTE

Primary cleaning shall be used on both pack and pleated filter elements. Do not disassemble pack filter elements for primary cleaning.

(c) Remove relief valve seat, ball, and spring.

(d) Install plugs in open ends of fuel filter.

(e) Immerse fuel filter, pleated elements, and relief valve parts in primary cleaner. Soak for 30 to 60 minutes to remove sludge and baked on contaminants.

(f) Remove fuel filter, pleated elements, and relief valve parts from cleaner.

(g) Rinse all parts with clean, hot running water. Drain or dry parts with low pressure filtered air.

(h) Accomplish paragraph (2) or (3) below as applicable.

(2) Ultrasonic Cleaning. (a) Fill an ultrasonic tank, having a minimum of 3 watts of power per square inch of tank bottom area, with cleaner and unplug filter.

(b) Place pleated elements in a coarse mesh wire basket with pleats in horizontal position, perpendicular to radiating surface of tank, allowing space between filters.

(c) Place metal valve parts in a separate basket.

(d) Immerse wire baskets in tank of cleaner and turn on power.

(e) Clean for 20 minutes, rotating pleated elements 90 degrees every 5 minutes.

(f) Remove pleated elements and metal valve parts from tank and drain or dry with low pressure filtered air.

(g) Check filters for cleanliness. Repeat cleaning if necessary.

(h) Install relief valve seat, ball, and spring.

(i) Install pleated filter element, a new gasket, and bowl.

(j) Secure bowl to fuel filter with acron nut.

(k) Clean filter pack elements the same as pleated elements by removing filter pack filters from center tube and sliding packs onto a rod rack which is supported horizontally in the tank. Allow approximately 1/4-inch space between filter packs. Rotating is necessary for filter pack element.

(3) Secondary cleaning. (a) Perform secondary cleaning only if ultrasonic cleaning is not available.

(b) Immerse filter elements and relief valve parts in cleaner and agitate.

(c) Remove any remaining deposits with a stiff bristled, nonmetallic brush.

(d) Drain filter element or dry with low pressure filtered air.

(e) Check fuel filter for cleanliness. Repeat cleaning if necessary.

(f) Accomplish steps b (8) through (10) above.

c. Inspection. (1) Inspect filter elements for cracks, tears, and distortion. Replace filter

element if damaged.

(2) Inspect relief valve parts for wear and damage. Replace all worn or damaged parts.

d. Installation. (1) Position fuel filter on engine firewall.

(2) Install bolts and washers securing fuel filter to engine firewall.

(3) Install fuel hoses on fuel filter.

(4) Install fuel drain valve on fuel filter.

5-112. ENGINE-DRIVEN FUEL PUMP.

5-113. The engine-driven fuel pump is a positive-displacement, vane-type pump with a built-in relief valve and bypass valve. The engine-driven fuel pump is driven by a direct coupling with the engine fuel pump drive. The relief valve is adjustable and may be set for desired fuel pressure. The bypass valve allows fuel under pressure from the fuel boost pump to bypass the engine-driven fuel pump should it fail or malfunction.

a. Removal. (1) Place fuel selector handle in OFF position.

(2) Remove fuel inlet and outlet lines from engine-driven fuel pump.

(3) Remove fuel drain and vent lines from engine-driven fuel pump.

(4) Remove nuts and washers securing engine-driven fuel pump to engine. Remove pump from engine.

b. Cleaning. (1) Clean new engine-driven fuel pump that has been flushed with oil by flushing with naphtha (item 16, table 1-8).

(2) Clean mating surfaces of engine-driven fuel pump and engine mounting pad with clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect engine-driven fuel pump for distortion and splines for wear.

(2) Inspect mating surfaces of engine-driven fuel pump and engine mounting pad for nicks, scratches, cracks, and distortion.

(3) Inspect fuel inlet and outlet ports for cracks and malformed threads.

(4) Check engine-driven fuel pump for freedom of operation.

d. Installation. (1) Install new gasket on engine mounting pad.

(2) Install engine-driven fuel pump on engine mounting pad and secure with washers and nuts. Torque nuts to 150-inch-pounds.

(3) Install fuel drain and vent lines.

(4) Coat threads of fittings with thread compound (item 44, table 1-8) and install fuel inlet and outlet lines on engine-driven fuel pump.

e. Adjustment. (1) Start engine in accordance

with TM 55-1510-201-10.

(2) Remove cap nut and insert a screwdriver in slot to lift relief valve adjustment screw lever clear of locking slot on thrust washer.

(3) Turn relief valve adjusting screw clockwise to increase pressure.

NOTE

Normal rated fuel pressure for the U-8F is 11-20 psi with a minimum of 6 psi and a maximum of 20 psi. Normal rated fuel pressure for the U-8D, U-8G, and RU-8D is 11-13 psi with a minimum of 9 psi and a maximum of 15 psi.

(4) When adjustment is completed, push relief valve adjusting screw lever into locking slot in thrust washer.

(5) Install cap nut.

(6) Stop engine in accordance with TM 55-1510-201-10.

f. Maintenance Operational Check. (1) Disconnect vent and drain lines from engine-driven fuel pump.

(2) Place mixture control lever in IDLE-CUT-OFF position.

(3) Place fuel boost pump switch in ON position.

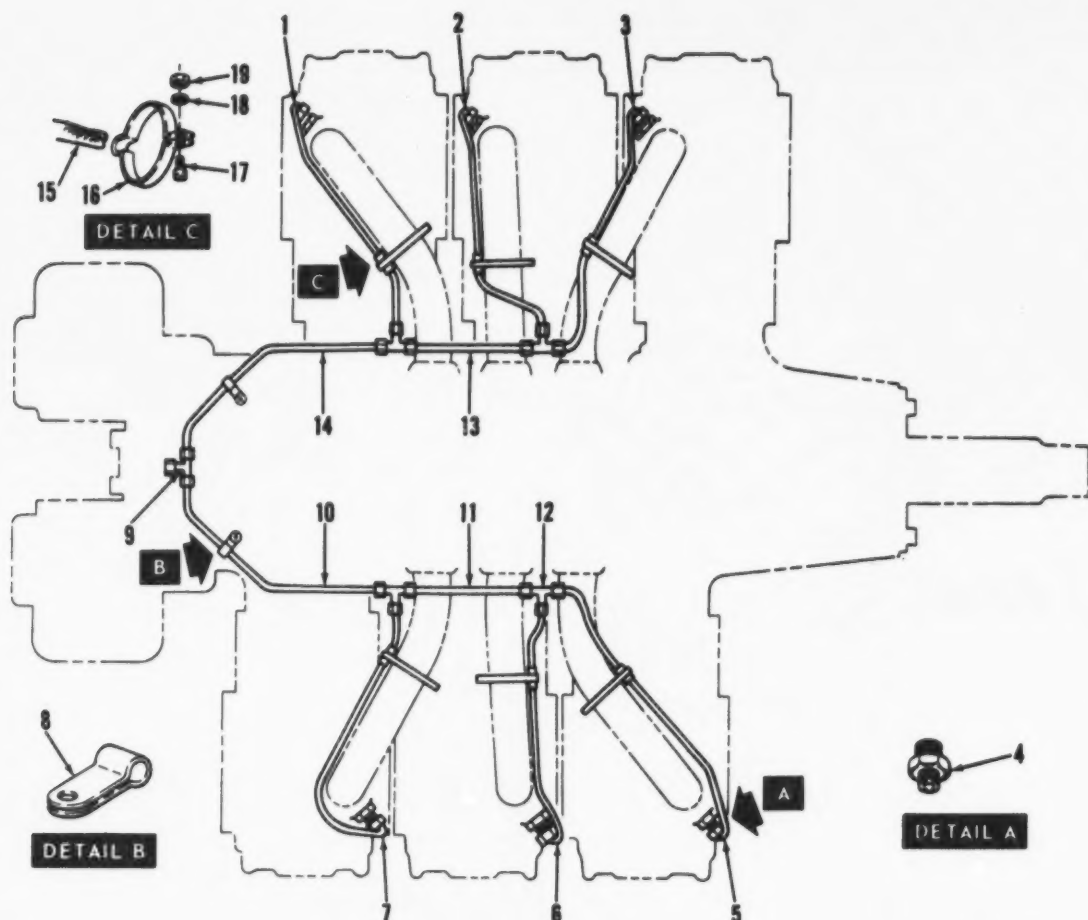
(4) If any fuel seepage or flow is noted, replace engine-driven fuel pump. (Refer to steps a through e.)

5-114. PRIMER SYSTEM.

5-115. The primer system consists of a primer solenoid valve and primer lines. The primer solenoid valve receives fuel under pressure from the fuel booster pump and supplies each cylinder with fuel for easier starting. (See figures 5-26 and 5-27.) A circuit breaker for the primer system is located on the right subpanel. Pushbutton primer switches for each engine are located just below the starter switch on the left side of the instrument panel.

5-116. PRIMER SOLENOID VALVE.

5-117. The primer solenoid valve is a normally-closed, electromagnetic, plunger-type valve with synthetic rubber seats. When the valve coil is energized, the plunger-type armature is withdrawn, opening the valve. This allows fuel to enter the primer lines connected to each cylinder. The plunger is returned to its seat by a compression spring inside the plunger, and the valve is held closed by fuel pressure in addition to the spring tension.



- | | | | | |
|----------------|----------------|-----------------|------------|------------|
| 1. Primer line | 5. Primer line | 9. Tee fitting | 13. Tube | 17. Screw |
| 2. Primer line | 6. Primer line | 10. Tube | 14. Tube | 18. Washer |
| 3. Primer line | 7. Primer line | 11. Tube | 15. Sleeve | 19. Nut |
| 4. Adapter | 8. Clamp | 12. Tee fitting | 16. Clamp | |

Figure 5-26. Primer system (U-8D, U-8G, and RU-8D)

a. Removal. (1) Remove inlet and outlet fuel lines from primer solenoid valve.

(2) Disconnect electrical lead from primer solenoid valve.

(3) Remove spacers, nuts, washers, and screws securing primer solenoid valve to mounting bracket.

(4) Remove primer solenoid valve.

b. Cleaning. Clean primer solenoid valve with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection (1) Inspect primer solenoid valve for evidence of leakage, cracks, and distortion.

(2) Inspect electrical connector for cracks and corrosion.

(3) Inspect mounting bracket for cracks. d. Installation. (1) Position primer solenoid valve on mounting bracket.

(2) Install screws, washers, nuts, and spacers securing primer solenoid valve to mounting bracket.

(3) Connect electrical lead to primer solenoid valve.

(4) Install inlet and outlet fuel lines on primer solenoid valve.

e. Maintenance Operational Check. (1) Discon-

nect a primer line at cylinder or at outlet side of primer solenoid valve.

(2) Place mixture control in IDLE-CUT-OFF position.

(3) Place boost pump switch in ON position.

(4) If any fuel seepage or flow is noted, replace primer solenoid valve. (Refer to steps a through d.)

(5) Connect primer line at cylinder or at outlet side of primer solenoid valve.

5-118. PRIMER LINES.

5-119. A fuel line is routed from the primer

solenoid valve to a tee fitting at the rear of the engine. The primer lines are connected from tee fittings to each cylinder. (See figure 5-26.)

a. Removal. (1) Disconnect primer lines (1, 2, 3, 5, 6, and 7, figure 5-26) from adapters (4) and tee fittings (12).

(2) Remove nuts (19), washers (18), and screws (17) securing clamps (16) to intake pipes.

(3) Remove primer lines (1, 2, 3, 5, 6, and 7) from engine. Tag each primer line for cylinder identification.

(4) Remove clamps (8) securing tubes (10, 11, 13, and 14) to engine. Remove tubes from engine.

b. Cleaning. (1) Clean primer lines and clamps

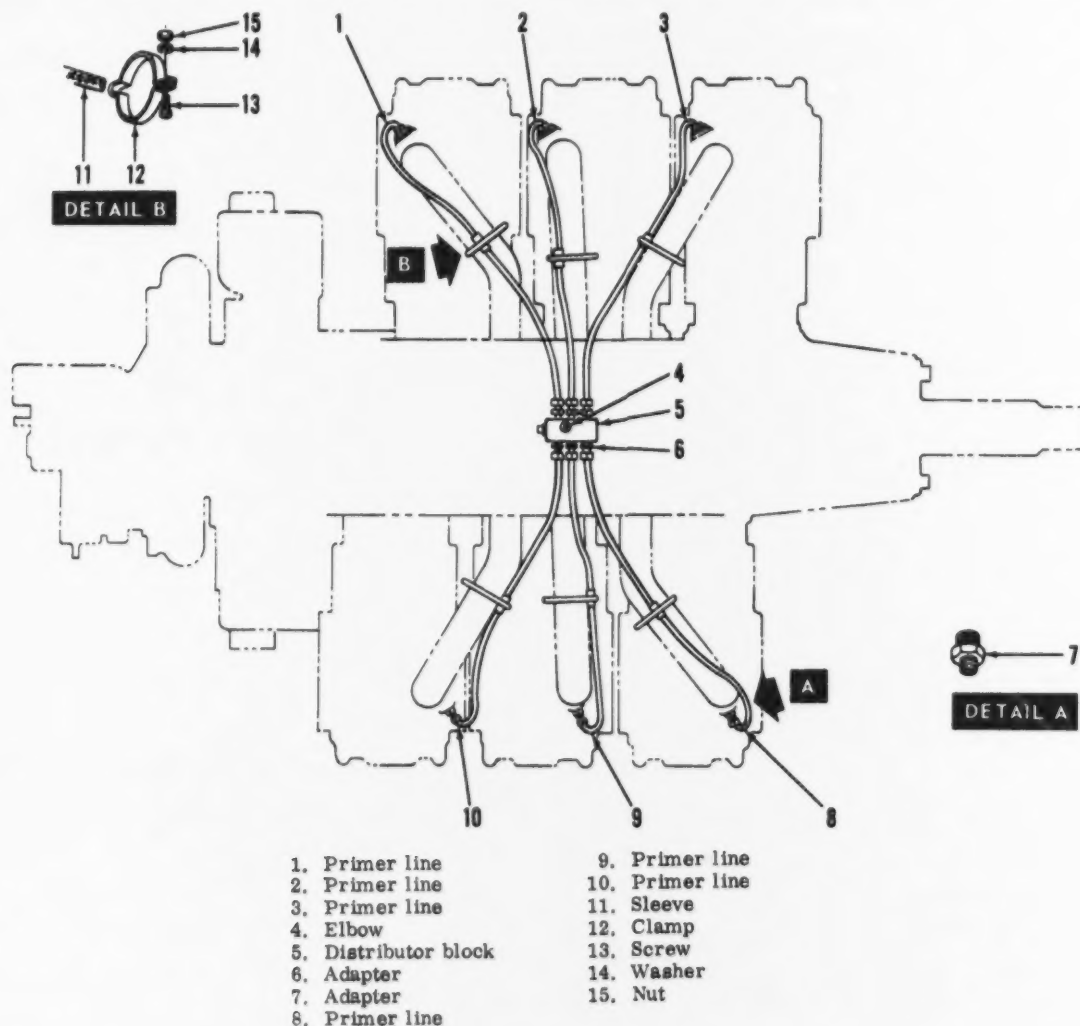


Figure 5-27. Primer system (U-8F)

with dry cleaning solvent (item 6, table 1-8).

(2) Dry with filtered, compressed air.

c. Inspection. (1) Inspect primer lines for cracks, dents, and evidence of leakage.

(2) Inspect primer lines for wear and chafing under clamps.

(3) Inspect sleeving around primer lines for cracks, chafing, and distortion.

d. Installation. (1) Position tubes (10, 11, 13, and 14, figure 5-26) on engine.

(2) Install clamps (8) securing tubes to engine.

(3) Position primer lines (1, 2, 3, 5, 6, and 7) on their respective cylinders. Connect primer lines to adapters (4) and tee fittings (12).

(4) Install clamps (16) around intake pipes. Ensure sleeves (15) are positioned under clamp.

(5) Install screws (17), washers (18), and nuts (19) securing clamps (16) to intake pipes.

(6) Place boost pump switch in ON position and operate primer solenoid valve.

(7) Check primer lines and connections for leaks.

5-120. PRIMER LINES. (U-8F)

5-121. The primer distributor block is mounted on the engine. Primer lines extend from the distributor block to each cylinder. (See figure 5-27.) A fuel line from the primer solenoid valve supplies fuel to the distributor block.

a. Removal. (1) Disconnect primer lines (1, 2, 3, 8, 9, and 10, figure 5-27) from adapters (6 and 7).

(2) Remove nuts (15), washers (14), and screws (13) securing clamps (12) to intake pipes. Remove clamps.

(3) Remove primer lines (1, 2, 3, 8, 9, and 10) from engine. Tag each primer line for cylinder identification.

b. Cleaning. (1) Clean primer lines and clamps with dry cleaning solvent (item 6, table 1-8).

(2) Dry with filtered, compressed air.

c. Inspection. (1) Inspect primer lines for cracks, dents, and evidence of leakage.

(2) Inspect primer lines for wear and chafing under clamps.

(3) Inspect sleeving on primer lines under clamps for chafing, cracks, and distortion.

d. Installation. (1) Position primer lines (1, 2, 3, 8, 9, and 10, figure 5-27) on their respective cylinders.

(2) Connect primer lines to adapters (6 and 7).

(3) Install clamps (12) around intake pipes. Ensure sleeves (11) are positioned under clamps.

(4) Install screws (13), washers (14), and nuts (15) securing clamps (12) to intake pipes.

(5) Place boost pump switch in ON position and operate primer solenoid valve.

(6) Check primer lines and connections for leaks.

5-122. TORSO FUEL TANKS. (U-8F)

5-123. Provisions for installation of torso fuel tanks are incorporated on aircraft serial No. 62-3832 through 62-3875. (See figures 5-28 and 5-29.) The torso fuel tanks allow extended range missions to be accomplished by U-8F aircraft. The torso fuel tanks are air-tight, bladder-type tanks with a capacity of 34 gallons each. An electrical fuel pump is installed on each tank. The number of torso fuel tanks to be installed (up to four) will be determined by the requirements of the mission. The torso fuel tanks are installed in the passenger seats and are secured by the seat belt and a shoulder-harness type bolt. A quick-disconnect fuel fitting and an electrical receptacle are provided on the left passenger seat deck to connect the torso fuel tanks to the fuel system. For troubleshooting procedures for the torso fuel tank system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Fuel pump and solenoid valve inoperative.	Circuit breaker switch tripped	Check circuit for shorts and reset circuit breaker switch.
Fuel pump inoperative.	Defective fuel pump.	Replace fuel pump.
	Loose or defective wiring.	Check for loose connections and test continuity of circuit.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Low fuel pump output.	Dirty fuel pump screen.	Clean fuel pump screens.
Solenoid valve inoperative.	Defective solenoid valve.	Replace solenoid valve. (Refer to paragraph 5-124.)
	Loose connections or defective wiring.	Check for loose connections and test continuity of circuit.

5-124. TORSO FUEL TANK SOLENOID VALVE. (U-8F)

5-125. The torso fuel tank solenoid valve, located in the fuel line just forward of the main spar in the left center wing section, controls torso tank fuel to the crossfeed line. A circuit breaker switch, located just aft of the fuel control panel, energizes the torso fuel tank solenoid valve and supplies power to the fuel pumps through the electrical receptacle on the left passenger seat deck.

a. Removal. (1) Ensure aircraft master switches are in OFF position.

(2) Place fuel selector handles in OFF position.

(3) Remove access panel located on underside of left wing center section and just forward of main spar.

(4) Disconnect electrical receptacle from torso tank solenoid valve.

(5) Disconnect inlet and outlet fuel lines from torso tank solenoid valve.

(6) Cap or plug fuel lines to prevent foreign material from entering fuel system.

(7) Loosen clamp securing torso tank solenoid valve and remove valve.

b. Cleaning. Clean torso tank solenoid valve

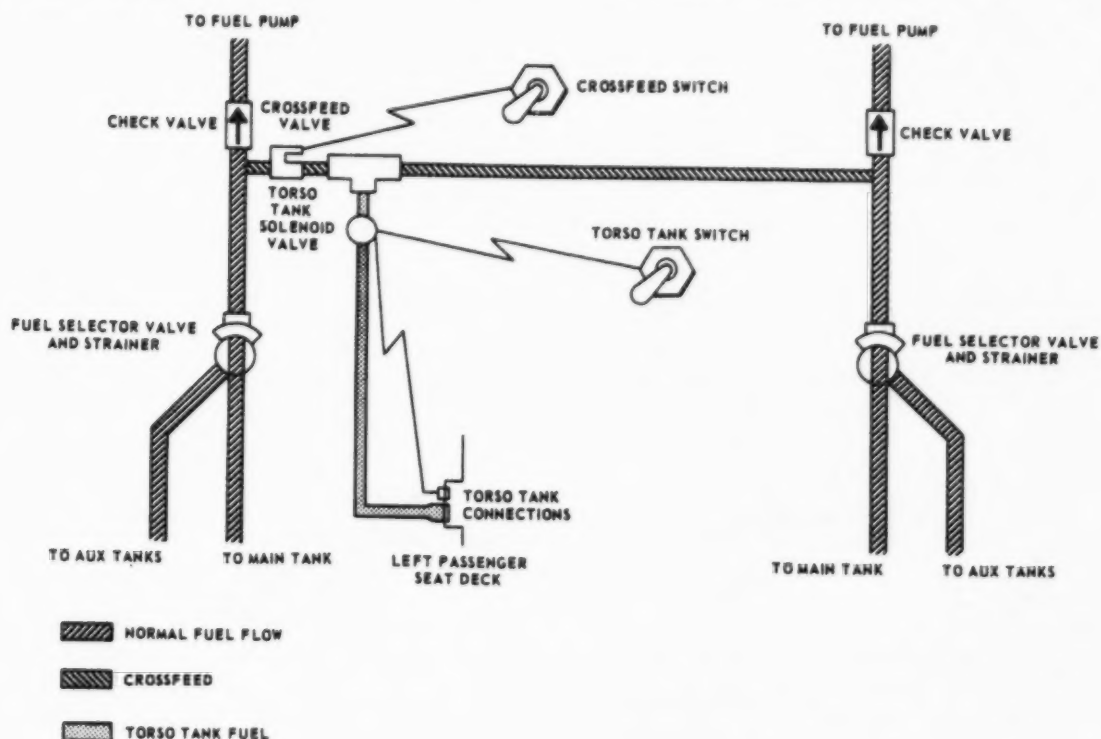


Figure 5-28. Torso fuel tank schematic (U-8F)

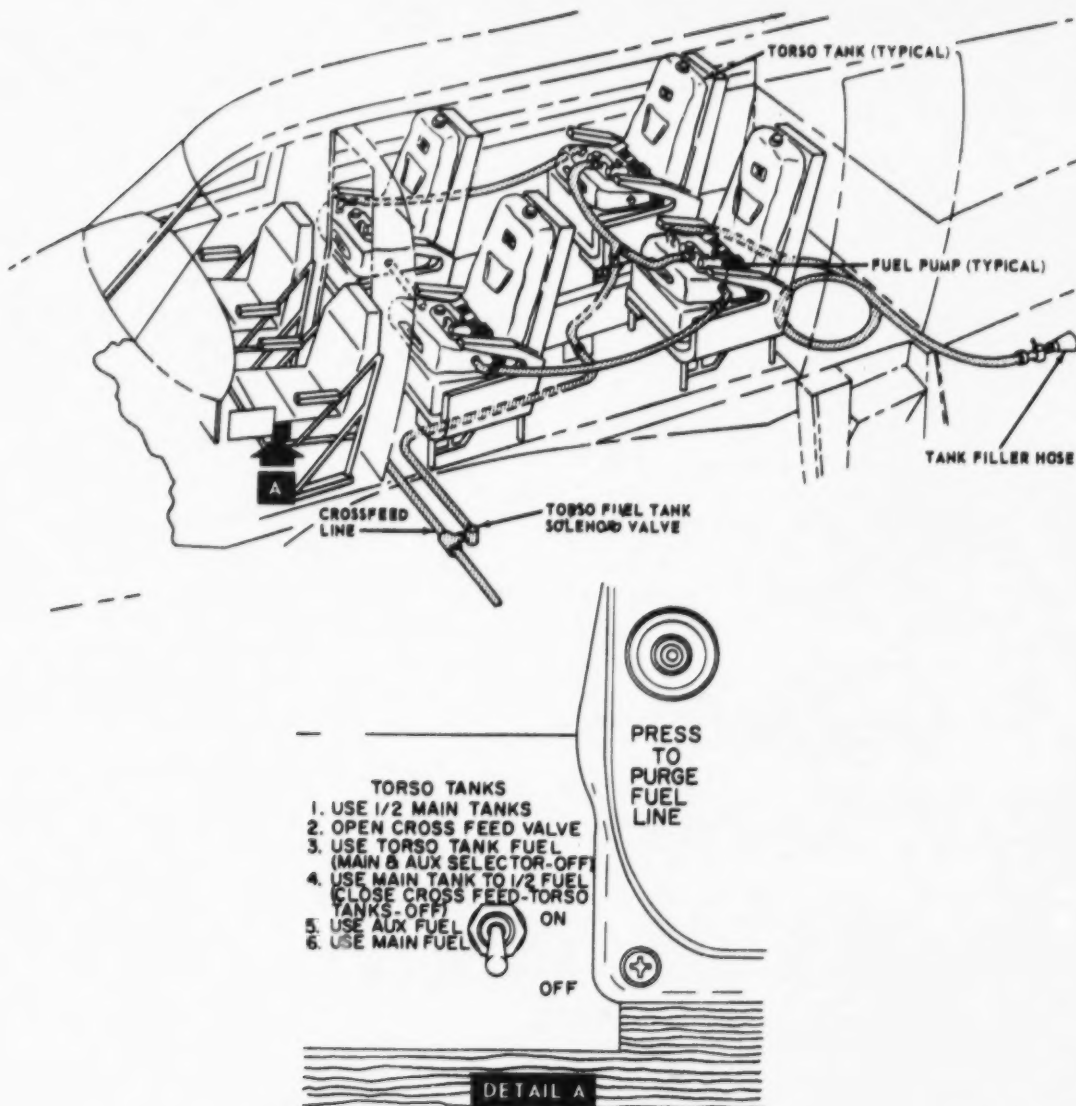


Figure 5-29. Torso fuel tank system (U-8F)

with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. **Inspection.** (1) Inspect torso tank solenoid valve for evidence of leakage, cracks, and distortion.

(2) Inspect electrical receptacle for cracks and corrosion.

(3) Inspect clamp for cracks.

d. **Installation.** (1) Position torso tank solenoid valve in clamp and tighten clamp.

(2) Remove caps or plugs from fuel lines.

(3) Connect inlet and outlet fuel lines to torso tank solenoid valve.

(4) Connect electrical receptacle to torso tank solenoid valve.

WARNING

Ensure all spilled fuel is cleaned from torso tank solenoid valve and surrounding area.

(5) Check torso tank solenoid valve and fuel line connections for leaks.

(6) Install access panel on underside of left wing center section forward of main spar.

5-126. TORSO TANK FUEL LINES. (U-8F)

5-127. The torso tank fuel lines are routed forward from the quick-disconnect fuel fitting through the main spar and to the left side of the fuselage. The fuel line passes through the fuselage skin into the wing center section where it is connected to the fuel crossfeed line.

a. Removal. (1) Ensure aircraft master switches are in OFF position.

(2) Place fuel selector handles in OFF position.

(3) Remove left passenger seats, seat deck carpets, and carpets and floor web just forward of main spar. (Refer to paragraphs 4-191, 4-206, and 4-208.)

(4) Remove access covers on seat deck.

(5) Remove access cover located on underside of left center wing section and just forward of main spar.

(6) Remove clamps securing torso tank fuel lines to aircraft structure.

(7) Disconnect torso tank fuel lines from fittings and at elbow located forward of main spar.

(8) Remove torso tank fuel lines from aircraft.

b. Cleaning. Clean torso tank fuel lines and fittings by flushing with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect torso tank fuel lines for chafing, cracks, dents, and distortion.

(2) Inspect mounting clamps for cracks.

(3) Inspect fittings for cracks and malformed threads.

d. Installation. (1) Place torso tank fuel lines in position on aircraft.

(2) Connect torso tank fuel lines to fittings and to elbow located forward of main spar.

(3) Install clamps on torso tank fuel lines and secure to aircraft structure.

(4) Install access cover on underside of left center wing section forward of main spar.

(5) Install access covers on seat deck.

(6) Install left passenger seats, seat deck carpets, and carpets and floor web just forward of main spar. (Refer to paragraphs 4-191, 4-206, and 4-208.)

5-128. TUBING, HOSE, CLAMPS, AND FITTINGS.

5-129. These items are used at various loca-

tions throughout the fuel system for the purposes indicated by their nomenclature. The items are positioned at strategic points and are utilized for the overall operation of the fuel system and its components.

5-130. TUBING AND HOSE.

5-131. Tubing and hose are used to transfer fuel from the fuel tanks from one component of the fuel system to another. Tubing and hose of the fuel system are constructed similarly, and are removed and installed similarly.

a. Removal. (1) During removal, rotate coupling nut of tubing or hose with one wrench while holding fitting to which it is secured with another wrench. This procedure prevents twisting of the tubing or hose.

(2) After removing tubing or hose, cap or plug ends to prevent entry of foreign material; also plug or cap fitting from which tubing or hose was removed for the same reason.

b. Cleaning. Clean tubing and hose by flushing with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect hose for chafing, fraying, and cuts.

(2) Inspect tubing for chafing, cuts and corrosion.

(3) Inspect for leakage and security of mounting.

d. Installation. (1) Remove cap or plugs installed during removal.

(2) During installation, rotate coupling nut of tubing or hose with one wrench while holding fitting to which it is being secured with another wrench. This procedure prevents twisting of the tubing or hose.

5-132. CLAMPS.

5-133. Clamps are used at various locations throughout the fuel system for the purpose of supporting tubing, hose, and component parts.

a. Removal. (1) Remove screw or bolt and nut securing clamp to tubing, hose, or component part.

(2) Remove clamps.

b. Cleaning. Clean clamps with dry cleaning solvent (item 6, table 1-8).

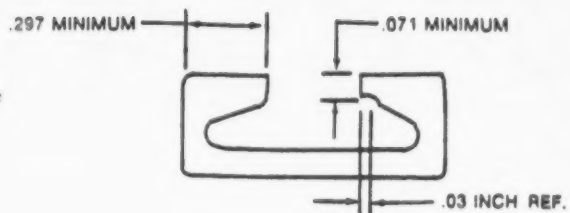
c. Inspection. (1) Inspect for cracks and elongated bolt holes.

(2) Inspect for peeling or torn rubber.

(3) Inspect for security of mounting.

d. Installation. (1) Install clamp on tubing, hose, or component part.

MEASUREMENTS GIVEN ARE
TYPICAL FOR BOTH SIDES OF
SEAT TRACKS.



Cabin Seat Track
Figure 4-28 A

the aft seats to the mounting tracks. All seats have seat belts, ashtrays, removable cushions, and reclining backs. The reclining back adjusting handle is located beside the front inboard corner of each seat bottom cushion.

a. Removal. (1) Lift sliding locks located on aft legs of forward seats, and rotate locks 90 degrees in either direction.

(2) Move forward seats either forward or aft until seat base fittings align with circular cutouts in mounting track.

(3) Lift forward seats from mounting tracks.

(4) Lift actuating tube and move right hand rear seat to forward position against spar.

(5) Lift right hand rear seat from mounting track.

(6) Remove stop screws from aft end of left hand set of mounting tracks.

(7) Lift actuating tube and slide left hand rear seat aft until it clears end of track.

b. Cleaning. Wipe off seat frames with clean cloth dampened with dry cleaning solvent (item 6, table 1-8) and dry with clean, dry cloth.

c. Inspection. (1) Inspect metal parts of seats for cracks, bends, or broken welds.

(2) Inspect locking mechanism for proper operation.

(3) Inspect seat tracks for cracks and security of installation.

(4) Every 600 hours or 12 months: Measure the entire length of the cabin seat tracks at 9.0 inch intervals, using the service wear criteria of Figure 4-28A. Replace the seat track if the given dimensions are not met. Measure the 0.071 dimension approximately 0.03 inch from the edge of the flange.

d. Installation. (1) Place right hand rear seat base fitting into slots provided in mounting track.

(2) Slide right hand rear seat aft to desired position.

(3) Align base fittings of forward seats with circular cutouts in mounting tracks and lower forward seats into mounting tracks.

(4) Engage sliding locks on aft legs of forward seats with mounting tracks.

(5) Slide left hand rear seat fittings into aft end of left hand set of mounting tracks.

(6) Install stop screws in aft end of left hand set of mounting tracks.

4-192. PASSENGER SEAT UPHOLSTERY. The passenger seats have foam rubber cushions which are covered with leather and fabric upholstery.

a. Removal. (1) Remove passenger seat from aircraft in accordance with paragraph 4-191.

(2) Remove seat cushion (14, figure 4-29) from seat, unsnap cover, and remove cushion.

(3) Slide stop pins (15) inward, toward center of seat, and rotate pins downward to lock them in retracted position.

(4) Holding adjustment handle (8) up, push seat frame bottom fully aft to free seat tracks (16) from pinions (2) and roller (9).

(5) Using a screwdriver or similar tool, pry open seat catches (13).

(6) Lift seat catches (13) free of mounting pivots (33), and slide seat frame aft out of seat base.

(7) Unsnap back cushion cover to remove cover and cushion from seat frame.

(8) Slip upholstered cover off foam rubber back cushion and frame. Remove cushion from seat.

(9) Remove front base panel (41), side base panel (43), and rear base panel (24) by removing screws (40, 42, and 46).

(10) Pull glued edges of upholstery (44) loose from base panels and slip upholstery off panels (41, 43, and 24).

b. Cleaning. Clean upholstery in accordance with paragraph 1-159.

c. Inspection. (1) Inspect upholstery for fraying, cuts, tears, and broken stitching.

(2) Inspect foam rubber cushions for damage.

d. Installation. (1) Assemble front base panel (41, figure 4-29), side base panel (43), and rear base panel (24). Place upholstery (44) over assembled panels and secure edges of upholstery to panels with cement (item 76, table 1-8).

(2) Position panel assembly against seat base frame and secure with screws (40, 42, and 46).

(3) Sprinkle talc (item 54, table 1-8) inside of back cushion cover and over upper part of back cushion.

(4) Position back cushion against seat back and slip upholstered cover over cushion and back.

(5) Work out all wrinkles in cushion and cover, and straighten seams. Secure cover with snap fasteners.

(6) Slide seat base into seat frame (32) from the rear, so that seat catches (13) hook over mounting pivots (33).

(7) Lock stop pins (15) in retracted position.

(8) Holding adjustment handle (8) in up position, slide seat forward to engage seat tracks (16) between rollers (9) and pinions (2). A screwdriver can be used to help start pinions onto tracks.

(9) Release stop pins (15) by rotating them aft.

(10) Release adjustment handle (8).

(11) Apply talc (item 54, table 1-8) on seat cushion and inside seat cushion cover.

(12) Insert cushion into cushion cover, working out wrinkles and straightening seams.

(13) Fasten cover snaps and place seat cushion (14) on seat frame.

(14) Install passenger seat in accordance with paragraph 4-191.

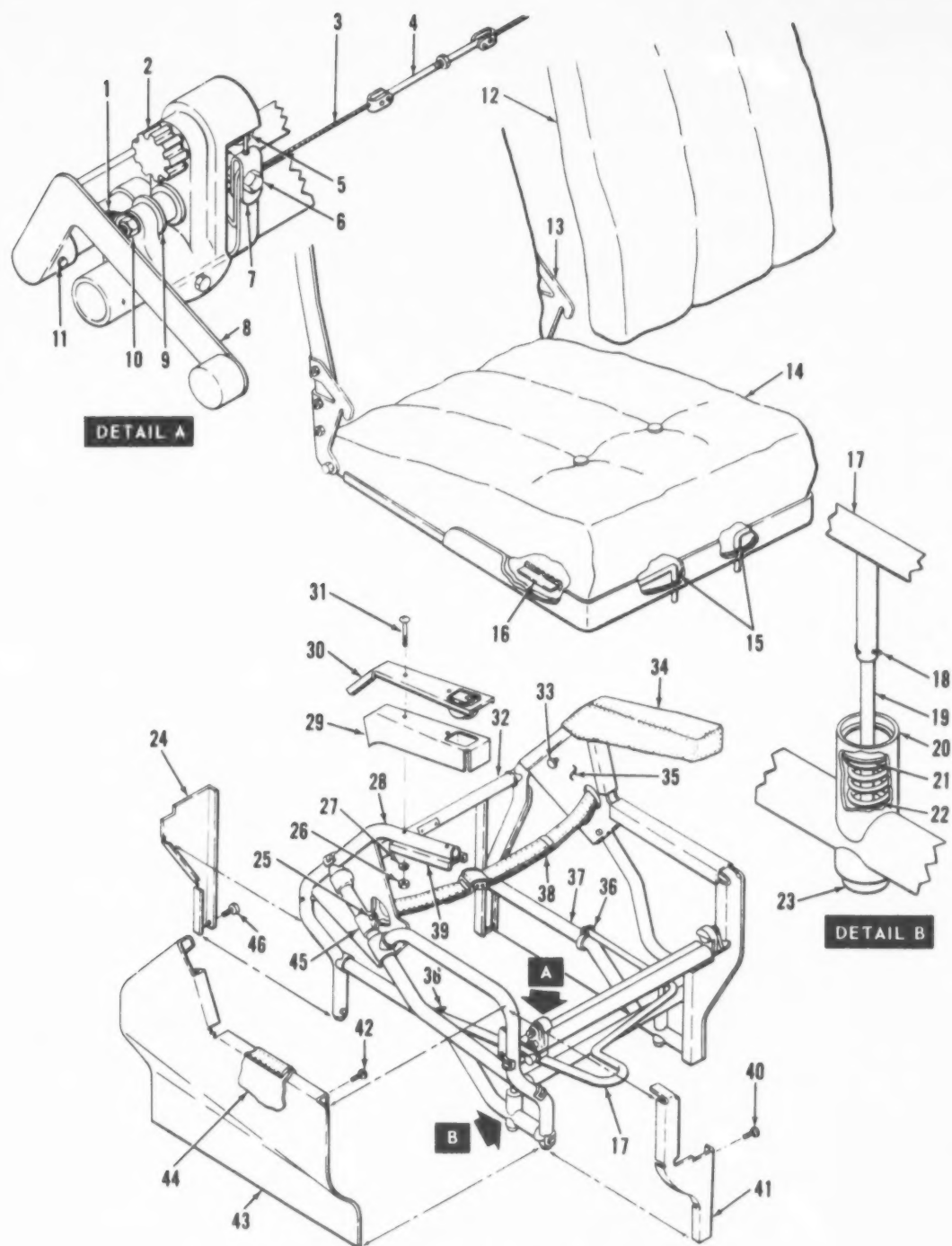


Figure 4-29. Passenger seat (U-8F) (sheet 1 of 2)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Oil pressure indication sluggish; oil temperature normal.	Congeaed oil in pressure line.	Remove pressure line. Remove congealed oil.
Hot weather operation: Oil pressure low; oil temperature high.	Grade of oil incorrect (too low viscosity.)	Replace oil with correct specification and grade. (Refer to paragraph 1-133.)
Oil pressure very low; oil temperature high.	System oil changeover to warmer climate.	Notify direct support personnel to adjust oil pressure.
Oil system contaminated (carbon and sludge); oil pressure low to normal; oil temperature normal to high.	Fouled oil filter.	Replace oil filter. (Refer to paragraph 5-144.)
High oil temperature.	Faulty operation of oil temperature regulator valve.	Replace oil cooler. (Refer to paragraph 5-140.)
	Oil cooler clogged.	Clean or replace oil cooler as required. (Refer to paragraph 5-140.)
Low or high oil pressure.	Improper operation of oil pressure relief valve.	Remove any foreign material and check seating of oil pressure relief valve. Check valve spring for tension.

5-138. OIL TANK.

5-139. The oil tank is located in the top of each nacelle just behind the firewall. An access door is provided in the nacelle for checking oil level and servicing the oil tank. Capacity of the oil tank is 4 gallons with 1/2-gallon expansion.

a. Cleaning. Wipe oil tank externally with a clean cloth slightly dampened in dry cleaning solvent (item 6, table 1-8).

b. Inspection. Inspect oil tank for cracks, dents, and punctures.

5-140. OIL COOLER AND OIL TEMPERATURE REGULATOR.

5-141. The oil cooler is of the plate and fin type construction. Cooling air passing over the top of the engine circulates through the oil cooler and out a discharge vent in top of the nacelle. During normal operation, engine oil passes through the oil cooler on its return to the oil tank. An oil temperature regulator built into the oil cooler opens a bypass valve and allows oil to return to the oil tank without passing through the oil cooler until the normal operating oil temperature has been attained. The oil

cooler is installed just forward of the firewall and in the center of the firewall.

a. Removal. (1) Remove upper half of cowl- ing. (Refer to paragraph 5-172.)

(2) Disconnect oil lines from oil cooler.

(3) Remove bolts securing oil cooler to discharge vent in top of nacelle.

(4) Remove oil cooler from nacelle.

(5) Remove bolts securing oil temperature regulator to oil cooler.

b. Cleaning. The oil cooler shall be flushed and cleaned at oil change as follows:

(1) Remove the four bolts securing the oil cooler valve housing to the radiator.

(2) Flush the cooler by spraying cleaning solvent (item 6, table 1-8) through the cooler. Air pressure shall not exceed 100 psi.

(3) Clean the temperature regulator and housing by washing in cleaning solvent (item 6, table 1-8). Avoid damaging the bellows of the temperature regulator.

(4) Install the oil cooler valve housing.

c. Inspection. (1) Inspect both faces of oil cooler for damaged tube ends.

(2) Inspect jacket and shell for dents.

(3) Inspect mounting flange of oil cooler and oil temperature regulator for dents or marks that would prevent a tight seal.

d. Installation. (1) Position oil temperature

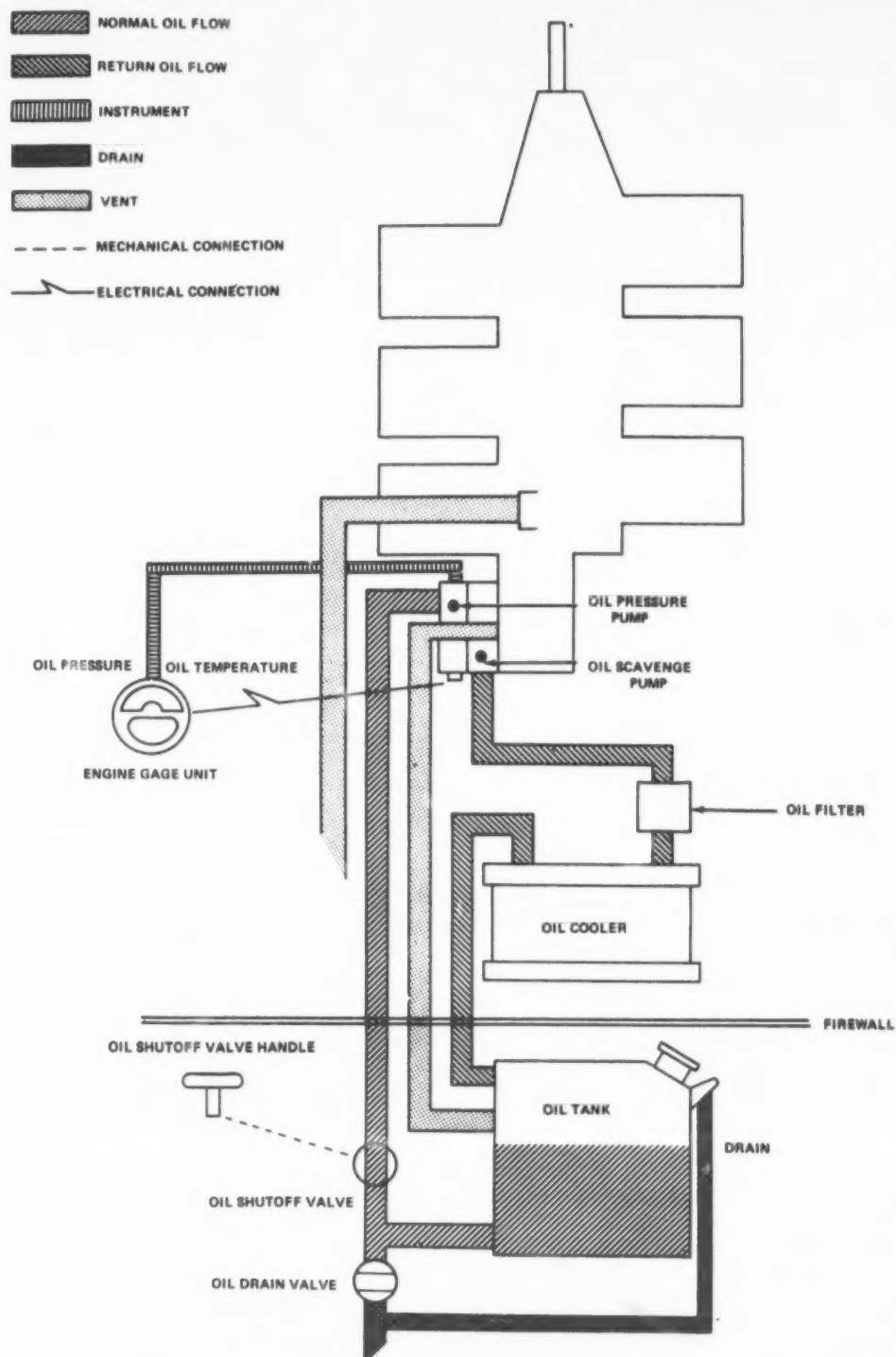


Figure 5-30. Oil system schematic

regulator on oil cooler and secure with bolts.

(2) Position oil cooler on discharge vent in top of nacelle and secure with bolts.

(3) Coat threads of fittings with grease (item 60, table 1-8) and connect oil lines to oil cooler.

(4) Install upper half of cowling. (Refer to paragraph 5-172.)

5-142. OIL PRESSURE PUMP.

5-143. The oil pressure pump and scavenge pump are combined into one assembly. A pressure relief valve on the upper forward corner of the oil pressure pump is adjustable to maintain pressure within the limits of 65 to 85 psi. An oil temperature sensing bulb is installed in back of the oil pressure pump. Adjust the oil pump as follows:

a. Start engine in accordance with applicable operator's manual (-10).

b. Operate engine at 2200 rpm with oil temperature at 75°C (167°F), and observe reading on oil pressure gage. If oil pressure is between 65 and 85 psi, no adjustment is necessary.

c. If oil pressure is not between 65 and 85 psi, stop engine, cut lockwire, loosen crown nut and adjusting screw locknut, and turn adjusting screw one or two full turns. Turn adjusting screw clockwise if pressure is too low, or counterclockwise if pressure is too high.

d. Tighten adjusting screw locknut and repeat steps b and c above. Adjust as necessary to obtain pressure of 65 to 85 psi.

e. When oil pressure has been adjusted satisfactorily, tighten adjusting screw locknut and install crown nut. Secure adjusting screw locknut and crown nut to oil pump with lockwire.

f. A magnetic chip detector is installed in the oil scavenge pump screen assembly. The chip detector provides early detection of metal particles contamination of the engine lubrication system; therefore reducing in flight engine damage or failure caused by metal particles.

WARNING

Turn in any metal particles found on chip detector plug or in filter element to direct support maintenance as such particles should indicate an impending engine failure.

g. To remove chip detector, cut lockwire and disconnect electrical connection.

h. Inspect chip detector for damaged threads and

wire for breaks and chafing.

5-144. OIL FILTERS.

5-145. Two oil filters are provided for each U-8 aircraft. An oil filter is mounted on the forward, left-hand side of each engine firewall. The oil filter contains a replaceable filter element to filter out particles of carbon, congealed oil, and metal, to prevent such particles from clogging the oil cooler or traveling farther in the engine lubrication system.

a. Removal. (1) Open upper engine cowling door.

(2) Remove nut, washer, and screw and disconnect ground strap from filter.

(3) Place a suitable container beneath the filter.

(4) Cut lockwire and remove plug (1, figure 5-31) and preformed packing (2). Drain oil from filter.

(5) Disconnect oil lines from filter. Remove nuts on mounting bands; open bands and remove filter.

b. Disassembly. (1) Loosen nut (6) and remove clamp (7).

(2) Remove cover (8), retainer (9), packing, preformed (10), and filter element (11).

c. Cleaning. Clean parts of oil filter with dry cleaning solvent (item 6, table 1-8).

d. Inspection. (1) Inspect all nuts, bolts, and fittings for damaged threads.

(2) Inspect cover, retainer, and shell for cracks and distortion.

e. Repair or replacement. (1) All preformed packings removed should be discarded and replaced with new preformed packings.

(2) Deleted.

f. Assembly. Install filter element (11), with large opening facing downward, and preformed packing (10) retainer (9), and cover (8). Secure cover with clamp (7) and nut (6).

g. Installation. (1) Position oil filter in mounting bands and secure bands with self-locking nuts. Connect oil lines to filter.

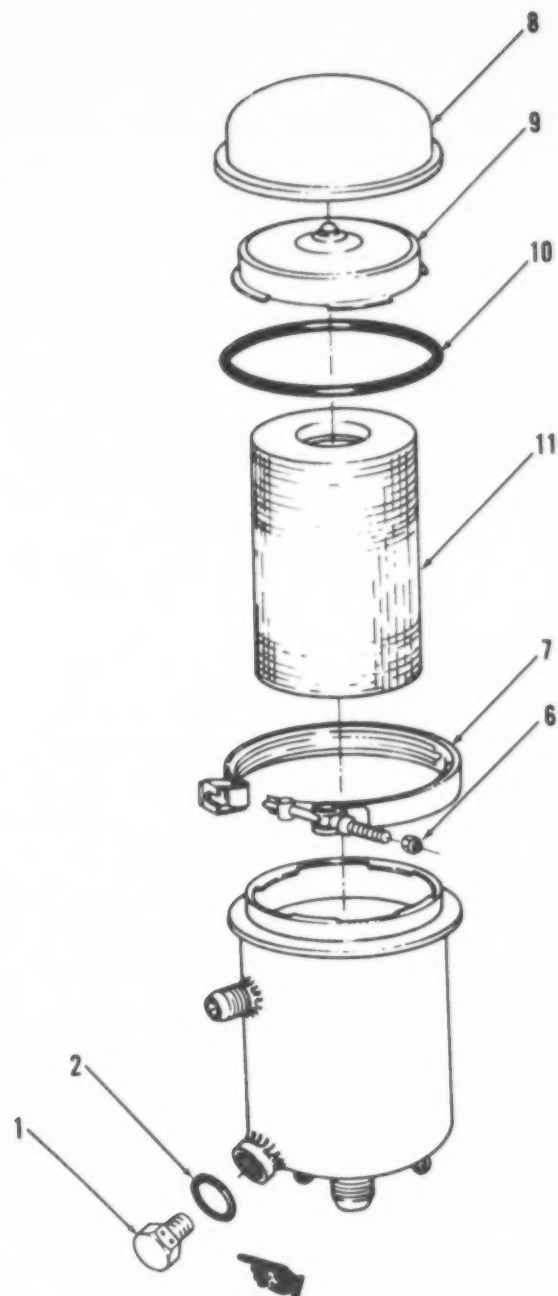
(2) Install new preformed packing, (2) on plug (1) and install plug in the bottom of the filter body. Secure with lockwire.

(3) Connect ground strap to filter with screw, washer, and nut.

(4) Close upper engine cowling door.

(5) Start engine in accordance with applicable operator's manual (-10). Allow engine to idle for a few minutes, then shut engine down in accordance with applicable operator's manual (-10).

(6) Check the general area of the oil filter for oil leaks. Check the engine oil level and add oil as



- 1. Plug
- 2. Packing, preformed
- 3. Deleted
- 4. Deleted

- 5. Deleted
- 6. Nut
- 7. Clamp
- 8. Cover

- 9. Retainer
- 10. Packing, preformed
- 11. Filter element

Figure 5-31. Oil filter

required in accordance with paragraph 1-133.

5-145A. FILTER ELEMENT.

5-145B. The full flow design 40 micron replaceable element has an outside to inside flow path.

a. Removal. Refer to paragraphs 5-145a(1), 5-145b(1) and 5-145b(2).

b. Inspection. Inspect filter element for metal or rubber like particles. Refer to chapter 5, section 2.

c. Installation. (1) Install element (11), with large opening facing downward, preformed packing (10), retainer (9), and cover (8). Secure cover with clamp (7) and nut (6).

(2) Close upper engine cowling door.

(3) Check area of oil filter for oil leak, refer to paragraph 5-145g(5) and (6).

5-146. OIL SHUTOFF VALVE.

5-147. The oil shutoff valve provides an emergency means of shutting off oil supply from oil tank to engine, and is located directly below the oil tank on the back side of the firewall. The oil shutoff valve is operated from the flight compartment. The valve has two positions, OPEN and CLOSED.

a. Removal. (1) Drain oil tank. (Refer to paragraph 1-134.)

(2) Disconnect oil line from fitting in top of oil shutoff valve.

(3) Disconnect oil lines from fitting in bottom of oil shutoff valve.

(4) Remove cotter pin, nut, washer, and bolt securing oil shutoff valve control to oil shutoff valve lever.

(5) Remove bolts securing oil shutoff valve to firewall. Remove oil shutoff valve.

(6) Remove fittings from oil shutoff valve.

b. Cleaning. Clean oil shutoff valve with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect oil shutoff valve for elongated or malformed mounting holes.

(2) Inspect oil shutoff valve for evidence of leakage and proper operation.

d. Installation. (1) Coat threads of all fittings with grease (item 60, table 1-8) and install fitting in top of oil shutoff valve.

NOTE

Oil shutoff valve must be positioned with oil shutoff valve lever pointing outboard. This will determine which port will be at top.

(2) Coat threads of tee fitting with grease (item 60, table 1-8) and install fitting in bottom port of oil shutoff valve.

(3) Position oil shutoff valve on firewall and install upper left bolt. Do not tighten bolt at this time.

(4) Install blower right bolt through clamp securing vent hose and through oil shutoff valve. Tighten both bolts.

(5) Coat threads of fittings with grease (item

60, table 1-8) and connect top and bottom oil lines to fittings.

(6) Position oil shutoff valve control on oil shutoff valve lever and secure with bolt, washer, nut, and cotter pin.

(7) Fill oil tank. (Refer to paragraph 1-133.)

(8) Adjust oil shutoff valve control. (Refer to paragraph 5-140.)

5-148. OIL SHUTOFF VALVE CONTROL.

5-149. Each oil shutoff valve is manually operated by a push-pull type T-handle located on the flight compartment floor near the pilot's seat. Pulling the handle full out closes the oil shutoff valve and shuts off all oil supply from the oil tank to the engine. Rotating the handle counterclockwise, after it has been pulled full out, locks it in the UP position. To open oil shutoff valve, turn handle clockwise and push down.

a. Removal. (1) Remove cotter pin, nut, washer and bolt securing clevis rod end to oil shutoff valve control lever.

(2) Remove clevis rod end and locknut from oil shutoff valve control.

(3) Remove bolts securing cable clamp to mounting bracket. Spread lines on cable and remove cable clamp from cable.

(4) Remove leading edge from center section wing. (Refer to paragraph 4-241.)

(5) Remove clamps securing oil shutoff valve control to leading edge of wing.

(6) Remove clamps securing oil shutoff valve control to engine controls.

(7) Pull end of oil shutoff valve control from engine nacelle.

(8) Remove pilot's and copilot's seats. (Refer to paragraphs 4-57, 4-114, or 4-159.)

(9) Remove floorboards from front seat area of U-8D, U-8G, and RU-8D aircraft and floor webs from pilot's compartment on U-8F aircraft. (Refer to paragraph 4-84, 4-133, or 4-177.)

NOTE

Remove center floorboards and either right or left floorboard as applicable.

(10) Remove locknut and handle from end of oil shutoff valve control.

(11) Remove nut, washer, and bolt securing oil shutoff valve control to mounting bracket.

(12) Ensure that all clamps and attachments have been removed and pull oil shutoff valve control from aircraft.

b. **Cleaning.** Clean oil shutoff valve control with dry cleaning solvent (item 6, table 1-8) and dry with filtered compressed air.

c. **Inspection.** (1) Inspect oil shutoff valve control for kinks, cracks, and distortion.

(2) Inspect cable clamps and mounting brackets for cracks.

(3) Inspect clevis rod end for cracks and malformed threads.

d. **Installation.** (1) Route oil shutoff valve control with engine controls through fuselage structure, through cabin wall, along leading edge of center section wing and into engine nacelle.

(2) Install inboard end of oil shutoff valve control in mounting bracket and secure to mounting bracket with nut and washer.

(3) Install locknut and handle on oil shutoff valve control. Do not tighten locknut at this time.

(4) Install cable clamps securing oil shutoff valve control on inside of fuselage and on leading edge of center section wing.

(5) On U-8F, secure oil shutoff valve control intermittently to engine controls with tape (item 53, table 1-8).

(6) Install cable clamp in groove in outboard end of oil shutoff valve control. Squeeze tines of cable clamp tight around oil shutoff valve control.

(7) Install bolt, washer, and nut securing cable clamp to mounting bracket.

(8) Install clevis rod end and locknut on end of oil shutoff valve control.

(9) Install clevis rod end on oil shutoff valve lever and secure with bolt, washer, nut, and cotter pin.

(10) Adjust handle to clear end of oil shutoff valve control housing when oil shutoff valve is in OPEN position (handle pushed in), and tighten locknut.

(11) Adjust oil shutoff valve control. (Refer to step e.)

(12) Install floorboards in front seat area of U-8D, U-8G, and RU-8D aircraft or floor webs in flight compartment of U-8F aircraft. (Refer to paragraph 4-84, 4-133, or 4-177.)

(13) Install pilot's and copilot's seats. (Refer to paragraphs 4-57, 4-114, or 4-159.)

NOTE

Install center floorboards and either right or left floorboards as applicable.

(14) Install leading edge center section wing. (Refer to paragraph 4-241.)

e. **Adjustment.** (1) Remove cotter pin, nut, washer, and bolt securing clevis rod end to

oil shutoff valve control lever.

(2) Loosen locknut and turn clevis rod end clockwise to shorten or counterclockwise to lengthen oil shutoff valve control.

(3) Adjust clevis rod end to fully open and fully close oil shutoff valve.

(4) Tighten locknut and install cotter pin, nut, washer, and bolt securing clevis rod end to oil shutoff valve control lever.

(5) Check oil shutoff valve for proper operation.

5-150. OIL DRAIN VALVE.

5-151. The oil drain valve is located on the back side of the firewall at the bottom of the wheel well.

a. **Removal.** (1) Drain oil tank. (Refer to paragraph 1-134.)

(2) Remove oil line between oil drain valve and oil shutoff valve.

(3) Loosen clamp securing drain hose to oil drain valve and pull oil drain valve from drain hose.

b. **Cleaning.** Clean oil drain valve with dry cleaning solvent (item 6, table 1-8).

c. **Inspection.** (1) Inspect oil drain valve for cracks and malformed threads.

(2) Inspect handle for cracks and proper operation.

d. **Installation.** (1) Position drain hose on oil drain valve and secure by tightening clamp.

(2) Coat threads of fittings on oil drain valve and oil shutoff valve with grease (item 60, table 1-8).

(3) Install oil line between oil drain valve and oil shutoff valve.

(4) Fill oil tank. (Refer to paragraph 1-133.)

5-152. TUBING, HOSE, AND FITTINGS.

5-153. Tubing, hose, and fittings are used throughout the oil system, for the purpose indicated by their nomenclature, to connect a component into a system, or to connect one component to another to complete a system.

a. **Removal.** All tubing, hose, and fittings are removed and installed similarly. Any peculiarity of removal or installation procedures will be determined by the physical construction and the manner in which the part is integrated and used in conjunction with its adjoining components.

(1) During removal, rotate coupling nut of tubing or hose with one wrench while holding fitting to which it is secured with another wrench. This procedure prevents twisting of

the tubing or hose.

(2) After removing tubing or hose, cap or plug ends to prevent entry of foreign material; also plug or cap fitting from which tubing or hose was removed for the same reason.

(3) Remove fittings from tubing, hose, or components with the correct size wrench to prevent malforming the fitting.

b. Cleaning. Clean removed tubing, hose, and fittings by flushing or submerging in dry cleaning solvent (item 6, table 1-8) and drying with clean, dry, compressed air.

c. Inspection. (1) Inspect hose for chafing, fraying, and cuts.

(2) Inspect tubing for chafing, cuts, and corrosion.

(3) Inspect fittings for malformed threads, cracks, and condition.

d. Installation. (1) During installation, rotate coupling nut of tubing or hose with one wrench while holding fitting to which it is being secured with another wrench. This procedure prevents twisting of the tubing or hose.

(2) Apply antiseize compound (item 45, table 1-8) to threads of fittings prior to installation.

(3) Install fitting using a suitable wrench of the proper size for fitting.

CAUTION

Do not overtighten fitting.

5-153A. GENERATOR. Inspect generator engine mounted internal splines for wear, as follows: Measure the top land of each spline tooth along entire length and compare smallest dimension with New Spline Dimension Diameter of 0.029. Spline is safe down to a top land dimension of 0.005, if service indicates the top land dimension may reach 0.005 during next service period, engine should be replaced.

SECTION VII IGNITION SYSTEM

5-154. IGNITION SYSTEM.

5-155. Each engine is equipped with two Bendix-Scintilla magnetos. The right magneto Type S6LN-22, fires the upper plugs on the right cylinders and the lower plugs on the left cylinders. The left magneto, type S6RN-23, fires

the upper plugs on the left cylinders and the lower plugs on the right cylinders. The left magneto is equipped with an impulse coupling to create a hotter spark and retard the spark to aid in starting. To eliminate radio interference, the ignition harness is shielded. (See figure 5-32 and 5-33.) For troubleshooting procedures for the ignition system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Engine fails to start.	Weak battery.	Recharge battery.
	Fouled spark plugs.	Replace spark plugs. (Refer to paragraph 5-169.)
	Internal magneto trouble.	Replace magneto. (Refer to paragraph 5-159.)
	Faulty ignition switch.	Replace ignition switch. (Refer to paragraph 12-17.)
	Faulty ignition switch cable.	Make continuity and high voltage tests on ignition harness. Replace as necessary.
Engine fails to idle properly.	Faulty or loose spark plugs.	Replace spark plugs as necessary. (Refer to paragraph 5-169.)
	Defective or improperly adjusted breaker points.	Adjust breaker points. (Refer to paragraph 5-159.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Engine runs rough.	Faulty or loose spark plugs.	Replace spark plugs as necessary. (Refer to paragraph 5-169.)
	Defective spark plug leads.	Replace spark plug leads as necessary.
	Defective magneto.	Replace magneto. (Refer to paragraph 5-159.)
Engine backfires.	Defective spark plugs.	Replace spark plugs as necessary. (Refer to paragraph 5-169.)
	Magnetos incorrectly timed.	Check magneto timing. (Refer to paragraph 5-159.)

5-156. ENGINE TIMING MARKS.

NOTE

5-157. To position engine for magneto timing, a reference mark has been placed on the right gear and a pointer installed in the top of the nose reduction gear case. (See figure 5-34.) Remove plug in reduction gear case and turn engine in normal direction of rotation until No. 1 cylinder is on compression stroke and timing mark and pointer align. No. 1 cylinder will then be in firing position.

Replacement breaker points are identified by a star stamped on the cam follower assembly.

a. Removal. (1) Ensure ignition switches are in OFF position.

(2) Remove necessary engine cowlings.

(3) Remove screws securing magneto outlet plates (20, figure 5-33) to magnetos (29 and 43) and remove plate with high tension leads attached.

5-158. LOCATION OF MAGNETO-TO-ENGINE TIMING POSITION. a. Remove spark plug from No. 1 cylinder.

b. Rotate crankshaft in direction of rotation until piston of No. 1 cylinder is on compression stroke.

c. Rotate crankshaft in direction of rotation until timing mark on ring gear aligns with pointer. (See figure 5-34.)

WARNING

The magnetos are not internally grounded; when the ground wires are disconnected, magnetos are hot. Removing high tension leads first and installing them last minimizes danger of starting engine accidentally when ground wires are removed from magnetos.

5-159. MAGNETOS.

5-160. The magnetos are flange-mounted, six-cylinder, single magnetos of opposite rotation. The right magneto (43, figure 5-33) turns counterclockwise and the left magneto (29) turns clockwise. Each magneto has a rotating two-pole magnet and stationary coil, giving two sparks for each complete revolution. The magneto is driven at one and one-half times crankshaft speed, since the six-cylinder engine requires one spark per cylinder for every two crankshaft revolutions.

(4) Remove ground wires from magnetos (29 and 43).

(5) Remove nuts (30), lockwashers (31), and washers (32) securing magnetos to engine.

(6) Lift magnetos from engine.

(7) Remove gaskets (38).

(8) On right magneto (43), remove cotter pin (39), nut (40), washer (41), and drive coupling (42).

(9) On left magneto (29), remove impulse coupling (33). (Refer to paragraph 5-161.)

b. Inspection. (1) Inspect breaker assembly compartment for cleanliness.

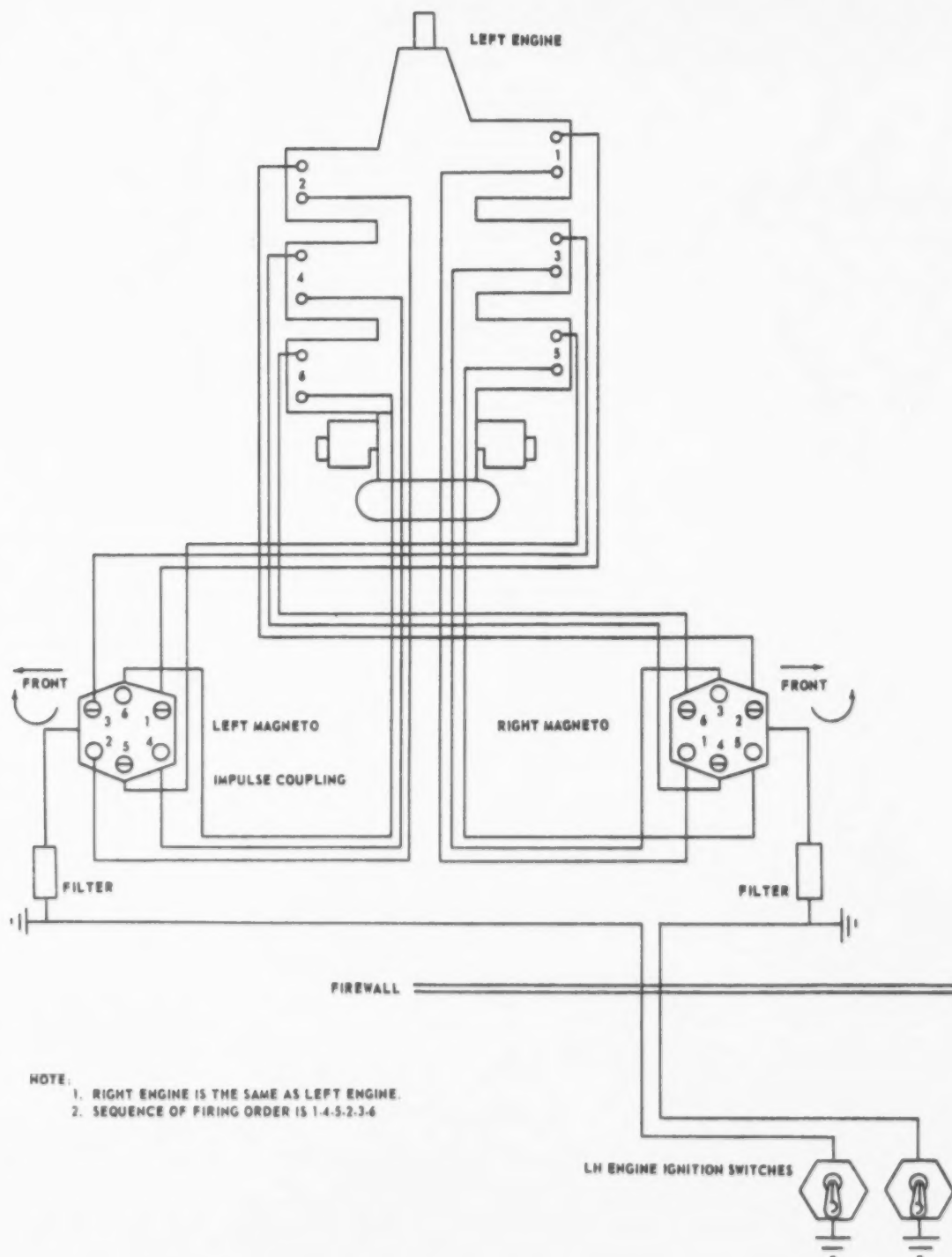


Figure 5-32. Ignition system schematic

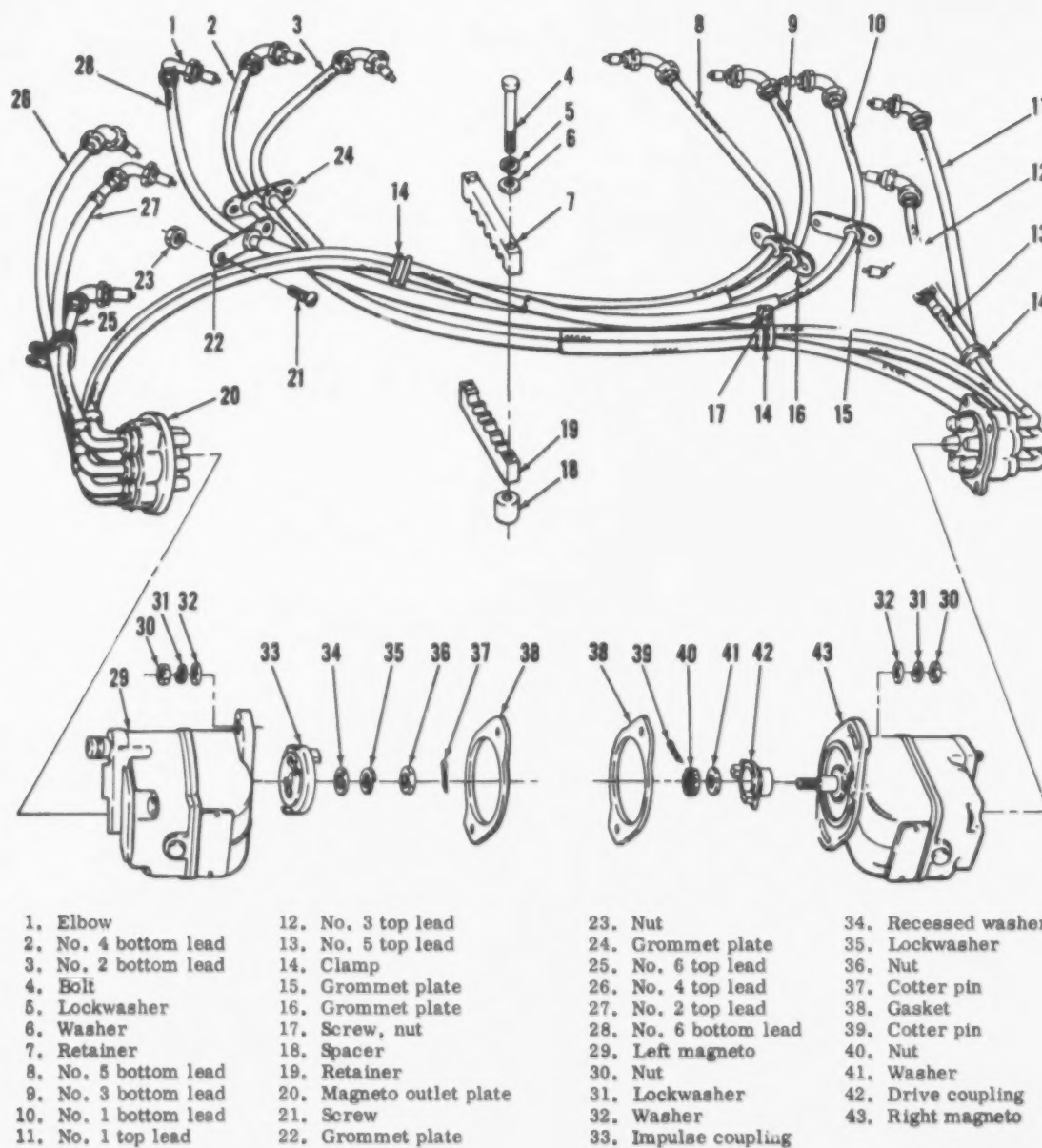


Figure 5-33. Ignition system schematic

(2) Inspect breaker points for excessive wear or burning.

(3) Check magneto drive coupling for security.

(4) Check magneto drive for freedom of operation.

(5) Inspect both sections of housing for cracks and stripped threads.

(6) Inspect breaker cover for dents and cracks.

c. Internal Timing Check. (1) Remove screws securing breaker assembly cover to magneto. Remove breaker assembly cover.

(2) Using a timing light, connect one of the red

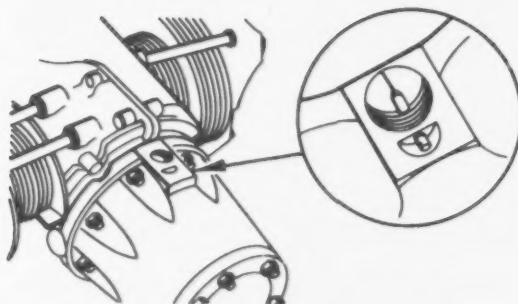


Figure 5-34. Engine timing marks

leads to the primary breaker points of magneto.

(3) Connect black lead (ground lead) of timing light to magneto housing.

NOTE

When checking magnetos that have an impulse coupling and are removed from the engine, turn rotor in direction opposite normal rotation to avoid engaging impulse coupling until timing mark on rotor gear is just past mark on magneto housing.

(4) Turn timing light switch on, then turn rotor in direction of normal rotation. As timing marks align, breaker points should just open and timing light should come on.

(5) If breaker points do not open when timing mark on magneto gear and stationary gear align (figure 5-35), adjust breaker points as follows:

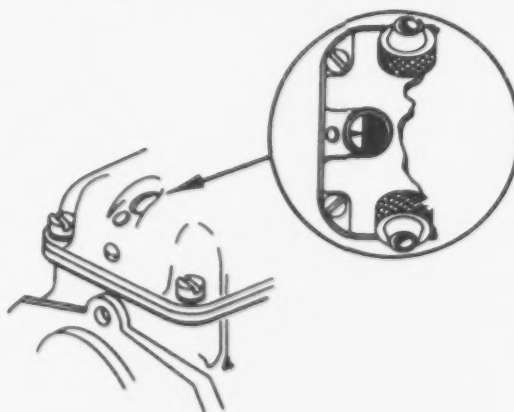


Figure 5-35. Magneto timing marks

(a) Slightly loosen screw in slotted hole and screw at opposite end of breaker point assembly.

(b) When timing marks align, shift breaker point assembly until breaker points just open, as indicated by timing light coming on.

(c) Tighten screw in slotted hole and screw at opposite end of breaker point assembly and recheck breaker point-to-magneto timing.

(d) Disconnect timing light.

(e) Install breaker assembly cover and secure with screws.

(6) Detail procedures for timing magnetos without timing marks in the breaker compartment, using timing kit, part No. 11-8150, are as follows:

(a) Remove timing inspection plug from top of magneto. Turn rotating magnet in its direction of rotation until pointed chamfered tooth on distributor gear is approximately in the center

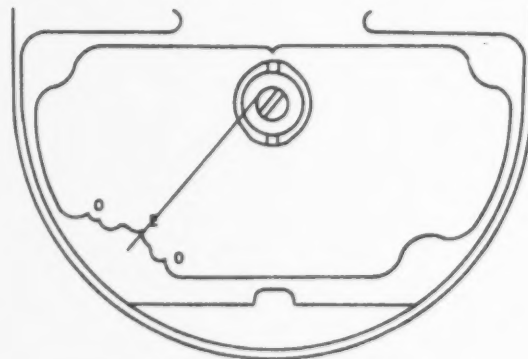


Figure 5-36. Timing marks in breaker compartment

of inspection window. Then turn it back until rotating magnet locates in its neutral or E gap position.

(b) Remove screw and flat washer from shaft of rotating magnet. Holding magnet in neutral position, install timing pointer on shaft of rotating magnet so it indexes with 0-degree mark on timing plate. Secure pointer in this position with screw.

(c) Turn rotating magnet in proper rotation until pointer indexes with respective 10-degree mark (E gap). Using a timing light, adjust main breaker contacts to open at this point. Turn rotating magnet until breaker cam follower is on high point of cam lobe. Measure breaker point clearance. Clearance must be 0.018 ± 0.006 inch. If not, readjust breaker assembly and recheck to be sure contacts will open within E gap tolerance of ± 4 degrees. Replace breaker as-

sembly if E gap tolerance and contact point clearance cannot be maintained within above limits.

- (d) Disconnect timing light.
- (e) Remove timing pointer and install screw and washer on shaft of rotating magnet.
- (f) Install timing inspection plug.
- (7) Detailed timing procedures for magnetos incorporating timing marks in the breaker compartment are as follows:

NOTE

Current production magnetos now incorporate timing marks in the breaker compartment. These timing marks allow the magnet to be timed more accurately than previously done when using the timing marks on the distributor block. New distributor blocks, part No. 10-52949 and 10-52958, do not incorporate the timing marks. The timing mark on older distributor blocks is to be disregarded when performing this new timing procedure. Magnetos without timing marks in the breaker compartment should be timed with timing template. These improved timing procedures provide accurate setting of the E gap and enable the magneto to be internally timed for optimum output. These instructions apply when it is necessary to replace breaker assemblies or check the internal timing of the magneto.

- (a) Remove timing inspection plug from top of magneto.

NOTE

On the right or left side of the breaker compartment plate there are timing marks indicating E and Zero positions. The marks on the left side, viewed from the breaker compartment are for clockwise rotation. The marks on the right side are for counterclockwise rotation. The point in the center of the E gap boss indicates the exact E gap position. (See figure 5-36.) In addition to these marks, some cams have indented lines across their ends for locating E gap position of the rotating magnet when aligned with marks at top of breaker housing. (See figure 5-36.)

- (b) If cam does not have an indented line across its end, turn rotating magnet in direction of rotation until pointed chamfered tooth on distributor gear is approximately in center of

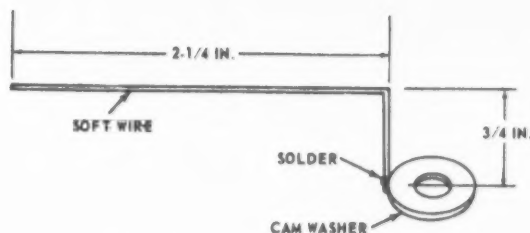


Figure 5-37. Timing pointer

inspection window. Then turn rotating magnet back until it locates in its neutral position.

- (c) Fabricate a pointer as shown in figure 5-37. Remove screw and flat washer from shaft of rotating magnet. Holding rotating magnet in neutral position, install pointer on shaft so it indexes with 0-degree mark. Secure pointer in this position with screw.

- (d) Turn rotating magnet in proper rotation until pointer indexes with E gap mark. At this point, scribe a line on end of cam so it indexes with mark at top of breaker compartment plate. Remove cam from shaft of rotating magnet and, using a small three-corner file, file an indented line across end of cam at the scribe mark. (See figure 5-38.)

- (e) Reinstall cam on shaft of rotating magnet.

- (f) Turn rotating magnet in direction of rotation until pointed chamfered tooth of distributor gear is just becoming visible in timing window. Continue turning rotating magnet until line on end of cam is aligned with mark at top of breaker housing plate.

- (g) Use a timing pointer as shown in figure 5-37.

NOTE

The wire pointer method may also be used.

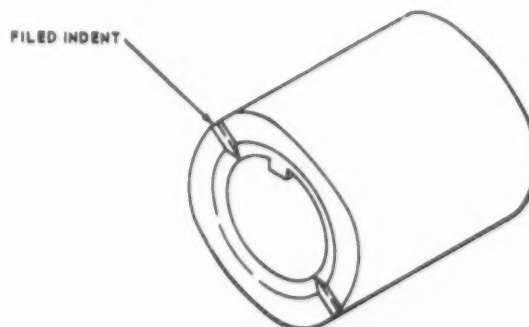


Figure 5-38. Cam with filed indent

(h) With indented line on cam aligned with mark at top of breaker plate, and with chamfered tooth on distributor gear visible in timing window, set pointer on E gap mark on side of breaker plate. Rotating magnet is now at its exact E gap position. Connect timing light across main breaker point. Adjust main breaker contacts to open at this point. Then turn rotating magnet until breaker cam follower is on exact high point of cam hole. Measure this contact clearance. It must be 0.018 ± 0.006 inch. If necessary, readjust breaker and recheck to be certain that contacts will open within E gap tolerance. Replace breaker assembly if E gap tolerance and contact clearance cannot be obtained.

(i) Remove timing light.

(j) Remove timing pointer and install screw and flat washer on shaft of rotating magnet.

(k) Install timing inspection plug.

d. Installation. (1) On left magneto (9, figure 5-33), install impulse coupling (33). (Refer to paragraph 5-161.)

(2) On right magneto (43), install drive coupling (42), washer (41), and nut (40). Secure nut with cotter pin (39).

(3) Locate correct crankshaft timing position as outlined in paragraph 5-159.

(4) Check magneto internal timing and adjust, if necessary, as prescribed in step c.

(5) Turn each magneto drive gear so chamfered tooth on magneto distributor gear aligns with pointer.

(6) Install magnetos (29 and 43) on engine, using new gaskets (38). Install washers (32), lock washers (31), and nuts (30). Tighten nut finger-tight.

(7) Connect one of timing light red leads to primary breaker point on each magneto, and connect black lead to ground.

(8) Shift each magneto in slotted mounting holes to a retard position. Turn timing light switch ON and slowly shift magneto toward advance position by tapping lightly with a mallet until breaker points just open. Tighten magneto mounting nuts (30) and recheck timing as described in step e.

(9) Turn ignition switches OFF.

(10) Turn timing light switch OFF and disconnect leads.

(11) Install ground wires.

(12) Position magneto outlet plates (20) on magnetos and secure with screws.

(13) Install engine cowling.

e. Checking Timing of Magnetos to Engine.

(1) Remove the high tension lead plate (item 20, figure 5-33) from left and right magnetos.

(2) Locate correct crankshaft timing position as outlined in paragraph 5-158.

(3) Turn crankshaft in direction opposite normal rotation one-fourth turn.

NOTE

When checking timing of installed magnetos that have an impulse coupling, turn the crankshaft of engine in normal direction of rotation to No. 1 cylinder top center position. As this point is reached, impulse coupling will act. This action can be heard as a clicking noise. Action of the impulse coupling turns the magneto to a position too far advanced for checking contact breaker points. Therefore, turn engine crankshaft backwards slowly until timing mark on chamfered tooth of large distributor gear just passes by pointer as seen through timing window in front of the magneto cover. Then connect timing light to magneto and turn crankshaft forward very slowly until contact points are just starting to open. At this position, timing marks should line up as shown in figure 5-35. (This time the impulse coupling will not act, as the turn backwards will not engage coupling drive pins.)

WARNING

Removal of the breaker assembly cover from the magneto renders the magneto "hot." Failure to remove the high tension lead plate prior to removing the breaker assembly cover could cause the engine to start when the propeller is moved.

(4) Remove breaker assembly covers from right and left magnetos.

(5) Connect respective timing light red leads to primary breaker points of right and left magnetos.

(6) Turn timing light switch ON.

(7) Turn ignition switches ON.

(8) Apply an even and equal torque to each cam retaining screw in direction opposite normal rotation to remove gear train backlash. While holding backlash out, turn crankshaft in direction of normal rotation until breaker points just open as indicated by timing lights coming on. Breaker point of both magnetos should open simultaneously; marks on magneto gear and magneto housing should align and crankshaft should be at correct timing position.

(9) If crankshaft is not at proper degree (25 degrees) before top dead center when breaker points open and marks align, as seen through magneto timing window (figure 5-35), magneto is not correctly timed to engine. Retime magneto to engine as outlined in step e and recheck timing.

(10) If marks on magneto gear and housing do not align when breaker points just open, adjust breaker points as outlined in step c. Recheck magneto-to-engine timing and retime if necessary.

NOTE

Breaker points will not be adjusted to compensate for incorrect magneto-to-engine timing.

5-161. MAGNETO IMPULSE COUPLING.

5-162. The left magneto incorporates a type 1C-H impulse coupling (33, figure 5-33), consisting of three major parts: body, spring, and cam assembly. A stop pin in the magneto flange engages the flyweights which, when tripped, actuate the impulse coupling. The impulse coupling rotates the magnet (between impulse trips) faster than engine cranking speed, thus generating a better spark for starting and automatically retarding the spark when starting the engine. When the engine is operating, the impulse coupling acts as a drive coupling for the magneto.

a. Removal. (1) Remove left magneto (29, figure 5-33) in accordance with paragraph 5-159.

(2) Remove cotter pin (37), nut (36), lockwasher (35), and recessed washer (34) securing impulse coupling (33) to left magneto (29).

(3) Using puller, part No. 11-702, remove impulse coupling (33) from shaft of magneto rotor.

CAUTION

Ensure puller is engaged behind cam assembly of impulse coupling.

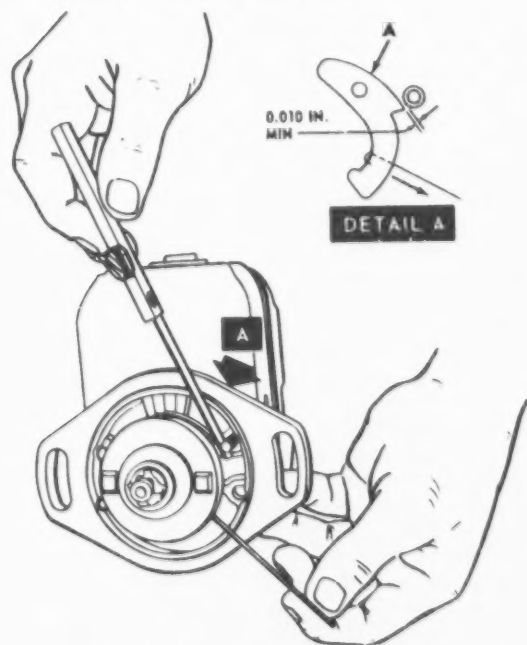


Figure 5-39. Checking flyweight clearance of impulse coupling

(4) Remove woodruff key from shaft of magneto rotor.

b. Cleaning. Clean impulse coupling with dry cleaning solvent (item 6, table 1-8). Dry with filtered compressed air.

c. Inspection. (1) Inspect stop pin for straightness and mutilation.

(2) Inspect all parts of impulse coupling for evidence of wear.

(3) Check for wear between flyweight axles and holes in flyweights.

d. Installation. (1) Install woodruff key on shaft of magneto rotor.

(2) Install impulse coupling (33, figure 5-33) on shaft of magneto rotor.

(3) Check clearance between flyweights and stop pins as follows:

(a) Bend a piece of stiff wire into a right angle 1/8-inch long (maximum).

(b) Pull heel of flyweight outward with hooked wire. (See figure 5-39.)

(c) Using a feeler gage check clearance between flyweight and stop pin. Minimum clearance shall be 0.010 inch.

(d) Check clearance of each flightweight at each pin.

NOTE

A true accurate check of clearance between flyweights and stop pins can only be obtained by pulling flyweight outward as described above. Do not attempt check by pushing in on flyweight at position A of figure 5-39.

(4) Install recessed washer (34, figure 5-33), lockwasher (35), and nut (36). Tighten nut to a torque of 15 to 25 foot-pounds. Install cotter pin (37).

(5) Install left magneto (29) in accordance with paragraph 5-159.

5-163. BREAKER ASSEMBLY AND CAPACITOR.

5-164. Flux reversals induce current in the primary winding when the contact points close. The flow of current in the primary winding stores energy which is released later by opening of the contact points, thereby producing high voltage in the secondary winding. When the contact points are closed, the primary circuit is completed, allowing current to flow in the primary winding. The capacitor stores current during opening of the contact points, thus preventing arcing or burning of the contact points.

a. Removal. (1) Remove screws securing breaker cover to magneto. Remove breaker cover and radio-shielded gasket.

(2) Remove screw securing primary lead and capacitor lead to breaker assembly.

(3) Remove screw securing capacitor to housing. Remove capacitor from housing.

(4) Remove screw securing breaker assembly to housing. Remove breaker assembly from housing.

b. Cleaning. (1) Clean breaker assembly with methyl-ethyl-ketone (item 24, table 1-8) and dry with compressed air, holding points open slightly so that methyl-ethyl-ketone will be completely evaporated from contact surfaces.

(2) Clean capacitor by wiping with a clean, dry cloth.

c. Inspection. (1) Inspect breaker cover for cracks or dents.

(2) Inspect capacitor mounting bracket for cracks or looseness.

(3) Inspect contact points for excessive wear or burning. Normal points will show a dull, slightly rough contact surface.

CAUTION

Do not open contact points more than 1/16-inch. Raising the main breaker spring beyond this distance may weaken spring and adversely affect magneto performance.

d. Installation. (1) Install capacitor in its recess in housing. Secure capacitor with screw.

(2) Lubricate felt pad on cam follower by saturating with lubricant (item 70, table 1-8), type IV, class 4. Allow approximately 30 minutes for lubricant to penetrate and thinner to evaporate. Blot felt with a clean dry cloth to remove excess lubricant.

CAUTION

Avoid getting any lubricant on contact surfaces.

(3) Install breaker assembly in housing. Secure breaker assembly with screws.

NOTE

Plain washer must be positioned over slotted mounting hole in breaker assembly.

(4) Secure breaker ground spring primary lead and capacitor lead to breaker assembly with screw.

(5) Check magneto timing in accordance with paragraph 5-159.

(6) Install radio-shielded gasket and breaker cover. Secure breaker cover to magneto with screw.

5-165. TESTING IGNITION SYSTEM. For procedures to be used in analyzing the ignition system, refer to TM 55-1500-204-25/1.

5-166. IGNITION HARNESS AND LEADS.

5-167. The ignition harness consists of 12 insulated, high tension wire circuits, shielded to prevent radio interference. Bottom leads from cylinders No. 2, 4, and 6 and top leads from cylinders No. 1, 3 and 5 connect to the right magneto. Bottom leads from cylinder No. 1, 3 and 5 and top leads from cylinders No. 2, 4 and 6 connect to the left magneto. (See figure 5-33.)

a. Removal. (1) Remove necessary engine cowlings.

(2) Disconnect elbows (1, figure 5-33) from spark plugs.

(3) Remove screws and nuts (17) securing clamps (14) to intake pipes. Remove clamps.

(4) Remove nuts (23) and screws (21) securing grommet plates (15, 16, 22, and 24) to inter-cylinder baffles.

(5) Remove bolts (4), lockwashers (5), washers (6), retainers (7 and 19), and spacers (18) securing ignition harness to engine.

(6) Remove screws securing magneto outlet plates (20) to left and right magnetos (29 and 43).

(7) Remove magneto outlet plates (20) and ignition harness from engine.

(8) Disconnect individual leads from magneto outlet plates (20) and remove leads.

b. Cleaning. Clean ignition harness with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect leads for dents, cracks, and evidence of chafing.

(2) Inspect elbows for distortion and elbow nuts for cracks and malformed threads.

(3) Inspect sleeves for cracks.

(4) Inspect clamps, grommet plates, and retainers for cracks and distortion.

d. Installation. (1) Connect leads to magneto outlet plates (20, figure 5-33).

(2) Position ignition harness with magneto outlet plates (20) over top of engine.

(3) Install magneto outlet plates (20) on left

and right magnetos (29 and 43). Secure magneto outlet plates to magnetos with screws.

(4) Position No. 1 bottom lead (10), No. 3 bottom lead (9), and No. 5 bottom lead (8) from left magneto (29) across top of crankcase.

(5) Position No. 2 bottom lead (3), No. 4 bottom lead (2), and No. 6 bottom lead (28) from right magneto (43) across top of crankcase.

(6) Position spacers (18) and retainer (19) on top of crankcase and position bottom leads into retainer.

(7) Position retainer (7) over retainer (19) and secure to crankcase with washers (6), lock-washers (5), and bolts (4).

(8) Install grommet plates (15, 16, 22, and 24) on intercylinder baffles and secure with screws (21) and nuts (23).

(9) Install clamps (14) around leads and secure clamps to intake pipes with screws and nuts (17).

(10) Connect elbows (1) to spark plugs.

(11) Install engine cowling.

(12) A new ignition harness assembly, P/N 10-320405-3, is available for replacement of the present harness on attrition basis only. This new light weight harness has improved characteristics for maximum service life and is immune to high humidity.

NOTE

After present stock of harness assembly P/N 10-320405-3, (color of insulation, Red) is exhausted, harness assembly P/N 10-620405-3, (insulation colored, blue) will be furnished. The difference between the two assemblies is the color and material of the insulation.

(13) Installation instructions are outlined in paragraph 5-167A, table 5-2, and figure 5-39.

(14) Only three (3) individual lead assemblies will be available for replacement of any of the twelve (12) leads installed.

NOTE

Any one of the lead assemblies may be made from one of the applicable three replacement leads by altering the length of the lead in accordance with the length shown in table 5-2.

e. Testing. When conducting the ignition harness lead test, possibility of leakage will exist between individual leads within the shielding, and from one electrode in the magneto cover to another electrode in the magneto cover. Hence, the test procedure used must be such that any of the foregoing conditions will be indicated when making the test. Proper operation of the ignition system is dependent upon proper installation as provided by the dielectric parts in the magneto. The parts of the ignition system contained in the magneto can generally be checked by electrical means. However, the part of the ignition lead at the spark plug elbow, due to variations in position between the installed position and electrical test position, cannot always be checked by electrical means. Hence, a visual inspection at this time is required in addition to the electrical check.

NOTE

In the event that a number of spark plugs are replaced in the same cylinder due to improper operation, a high-tension harness check will be made. All defective leads and/or magneto covers will be replaced.

(1) The high-tension ignition test may be accomplished with any of the following approved testers:

(a) Delco.

(b) Hoke, Model 61A.

(c) Electronic Brazing Company, Model 178.

(d) Tensor Electrical Development Company, Model 1111.

(2) Disconnect all leads from spark plugs and ground each lead to engine.

(3) Connect ground wire of tester to engine or airframe.

(4) Connect lead wire from tester to one lead at a time of harness, regrounding each lead after lead has been tested.

(5) If leakage is indicated, rotate crankshaft to determine if leakage is eliminated with a different crankshaft position.

NOTE

If leakage stops with a different crankshaft position, it indicates leakage was through distributor finger to magneto, then through secondary coil to ground, and does not constitute a lead or harness breakdown.

(6) If during high-tension electrical test, two or more leads show leakage, repeat test on one of leads showing leakage, with other lead having leakage insulated from engine. If insulating other lead eliminates indication of leakage on lead being tested, then leakage is either between two leads or between corresponding electrodes in magneto cover. Remove all defective leads from magneto cover and retest. Replace defective leads and/or magneto covers as necessary.

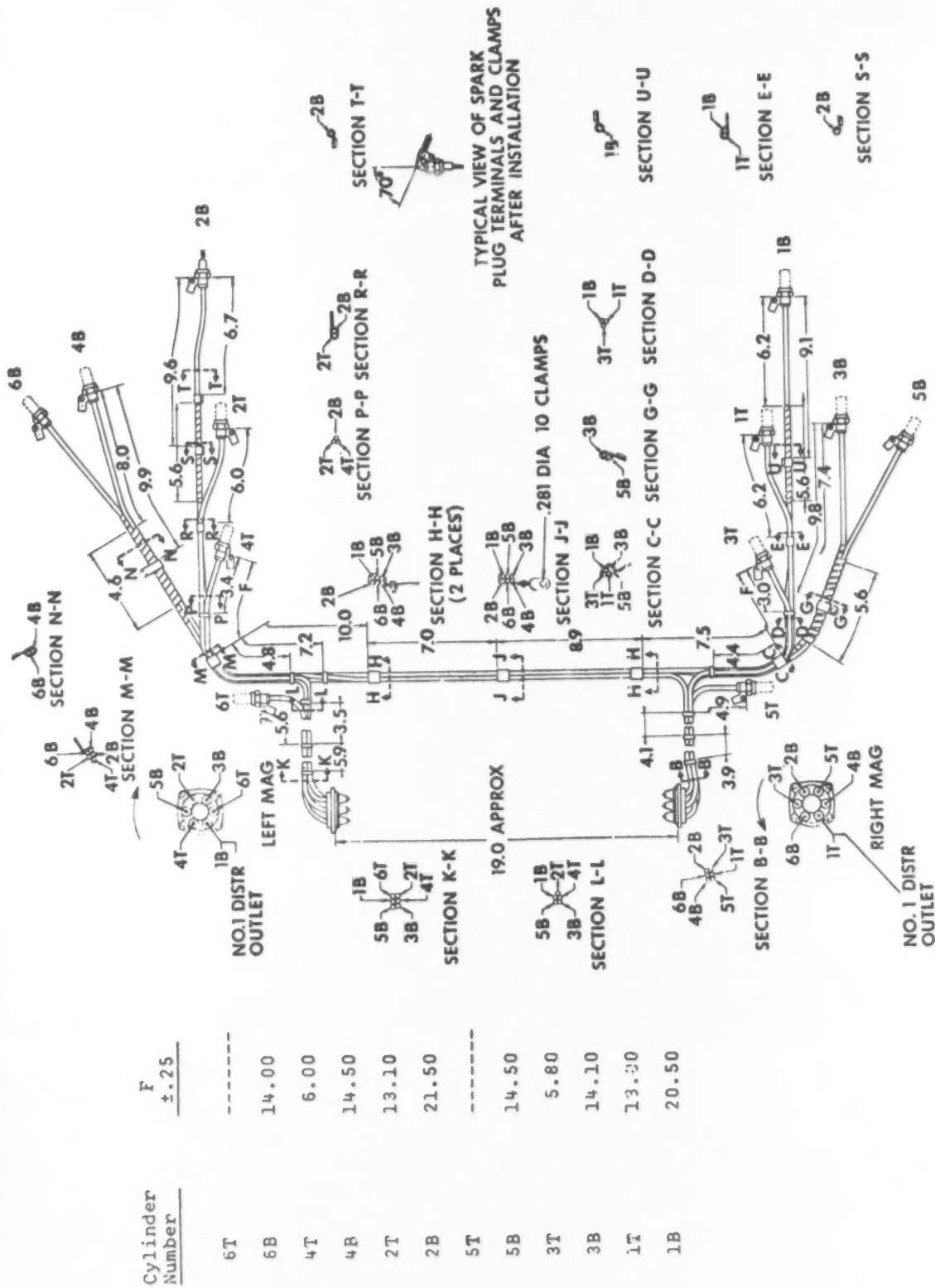
5-167A. INSTALLATION OF REPLACEMENT HARNESS.

a. Removal. (1) Remove existing ignition harness from engine. Remove and discard the spark plug high tension lead grommet plates from the inter-cylinder cooling baffle plates located on the under side of the cylinders. Retain mounting hardware for use with new plates.

Table 5-2. Lengths of lead assemblies

ITEM	PART NUMBER	LENGTH	MAKE FROM	CYLINDER AND POSITION	MAGNETO
Lead assembly	10-320565-34	17.9"	10-320565-70	6T	L
Lead assembly	10-320565-36	18.9"	10-320565-70	5T	R
Lead assembly	10-320565-56	28.9"	10-320565-70	4T	L
Lead assembly	10-320565-55	28.4"	10-320565-70	3T	R
Lead assembly	10-320565-67	34.4"	10-320565-70	2T	L
Lead assembly	10-320565-70	35.9"		1T	R
Lead assembly	10-320565-115	58.4"		5B	L
Lead assembly	10-320565-114	57.9"	10-320565-115	6B	R
Lead assembly	10-320565-113	57.4"	10-320565-115	4B	R
Lead assembly	10-320565-113	57.4"	10-320565-115	3B	L
Lead assembly	10-320565-126	63.9"	10-320565-130	2B	R
Lead assembly	10-320565-130	65.9"		1B	L

NOTE: The above lead assemblies have "red" colored insulation. When present stock is exhausted, lead assemblies will be replaced by P/N 10-320610, with the same dash (-) numbers as in above table. (Insulation will be colored blue.)



(2) Replace each spark plug high tension lead grommet plate with two of the Bendix 10-320546 spark plug cable plates at each location as follows:

a. 0-480-1 Engine - Mismatch the slots in a pair of 10-320546 plates and install at each location from which a grommet plate was removed. Secure with screws and nuts retained from former installation, thereby completely closing openings in baffle plates.

b. 0-480-3 Engine - Mismatch the slots in a pair of 10-320546 plates and install in each location where the injector sensing tubes do not pass through the baffle plates. Where injector sensing tubes are involved, install grommets 10-320502-1 on tubes and match slots in pairs of 10-320546 plates. Install matched plates on baffle plates and secure with screws and nuts retained from former installation. Position grommets on sensing tubes so that they may be slid into slots in 10-320546 plates.

(3) Cut 7/8 (0.875) of an inch from the end of each spark plug cooling air blast tube on the cowl-ing to prevent interference between ends of cooling tubes and the spark plug high tension leads and elbows.

(4) Install 10-320405-3 wiring harness assembly on the 0-480-1 engine as shown in figures 5-39B and 5-39C. Refer to figures 5-39D, 5-39E and 5-39F when installing 10-320405-3 wiring harness assembly on the 0-480-3 engine.

(5) During harness installation, dress leads to engine so that no lead is taut or touching any part of engine, engine mount or accessories.

(6) Upon completion of installation, examine all leads, clamps and nylon ties for proper positioning and secureness. Final harness configuration shall conform as nearly as possible to views shown in figures.

5-167B. DISASSEMBLY.

NOTE

Clean, inspect and test the harness assembly before proceeding with disassembly. The need for, and extent of, disassembly shall be determined by the results of inspection and test procedures.

(1) To disassemble one or more lead assemblies, remove clamps and brackets from applicable assembly. Cut cable ties from assembly and discard.

(2) Cut off condemned lead flush with outer surface of cable outlet plate.

(3) Apply pliers to eyelet and pull short length of conductor out of grommet and cable outlet plate.

(4) Using a 3-inch long 0.270-inch-diameter drift, applied at outer surface of plate, drive out tapered ferrule and remaining pieces of insulation and shielding.

5-167C. CLEANING.

Wipe exterior of the assembly with a clean, lintless cloth dampened in solvent. Dry with a light air blast.

5-167D. INSPECTION.

Check lead assemblies for abrasion, mutilated brading or other evidence of physical damage. Inspect spark plug sleeves for cracks or carbon tracking. Check spring for distortion. If any damage is evident, remove and replace defective component in accordance with repair or replacement section.

5-167E. REPAIR OR REPLACEMENT.

(1) To replace one or more lead assemblies follow steps in disassembly and reassembly. Remove only applicable clamps and brackets.

(2) If spring or sleeve at spark plug end of lead assembly is damaged, remove and replace as follows:

(3) Using an 11-7073 needle or a mechanical pencil with the lead retracted, hook the end of spring.

(4) Using the needle or pencil, unscrew the spring.

(5) Slide sleeve and spring off end of lead assembly.

(6) Replace defective component and reassemble as follows:

a. Fabricate a tool as shown in figure 5-39G for installing the insulating sleeves over cable terminals.

b. Push the tool through insulating sleeve and spring retainer assembly. Screw the cable terminal into the tool.

c. Work sleeve and spring retainer assembly into position over the cable and unscrew the tools. Install spring on cable terminal.

NOTE

It may be necessary to lubricate the cable and insulating sleeve with a thin film of commercial grade alcohol to facilitate assembly.

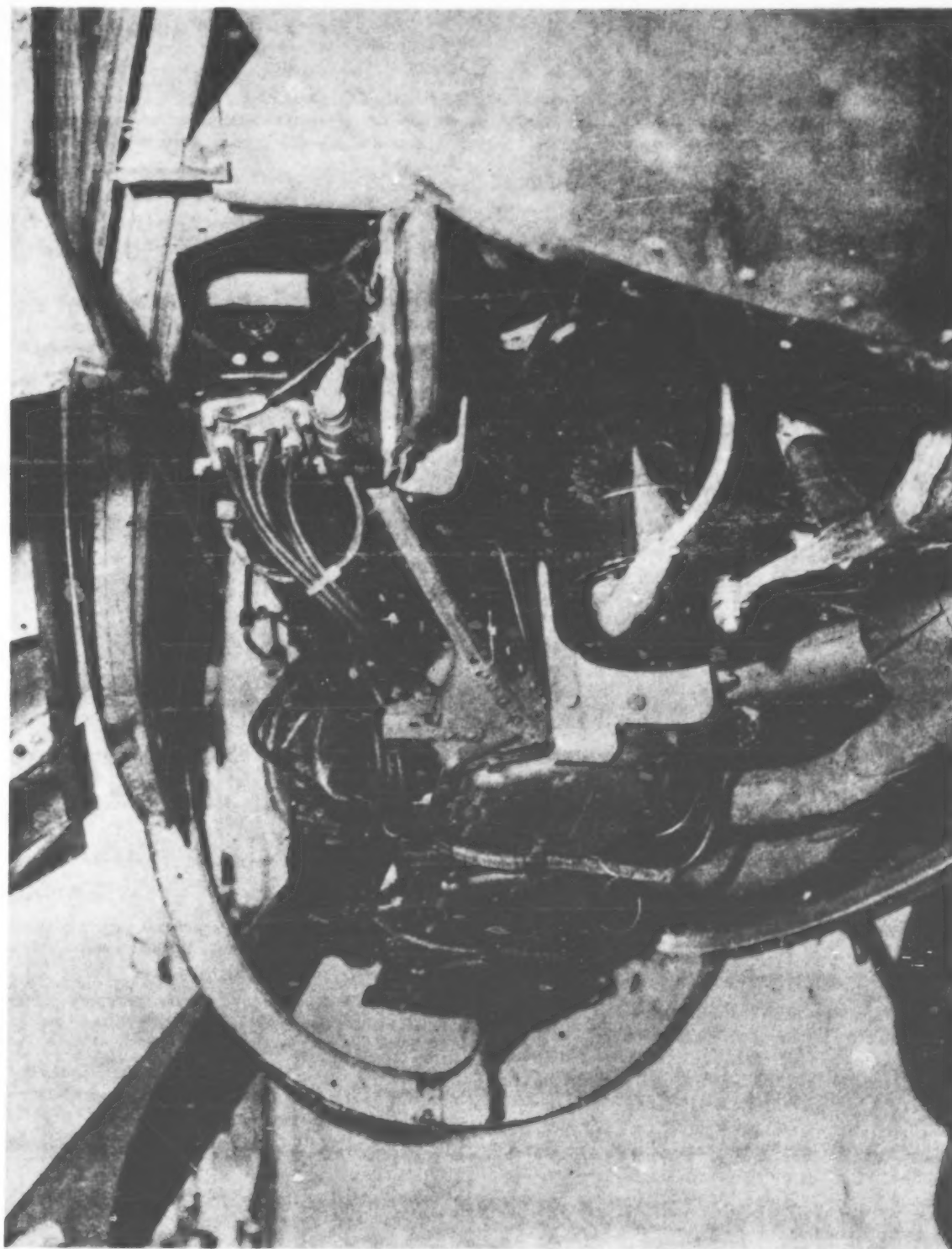


Figure 5-398. 0-480-1B Engine Harness Installation

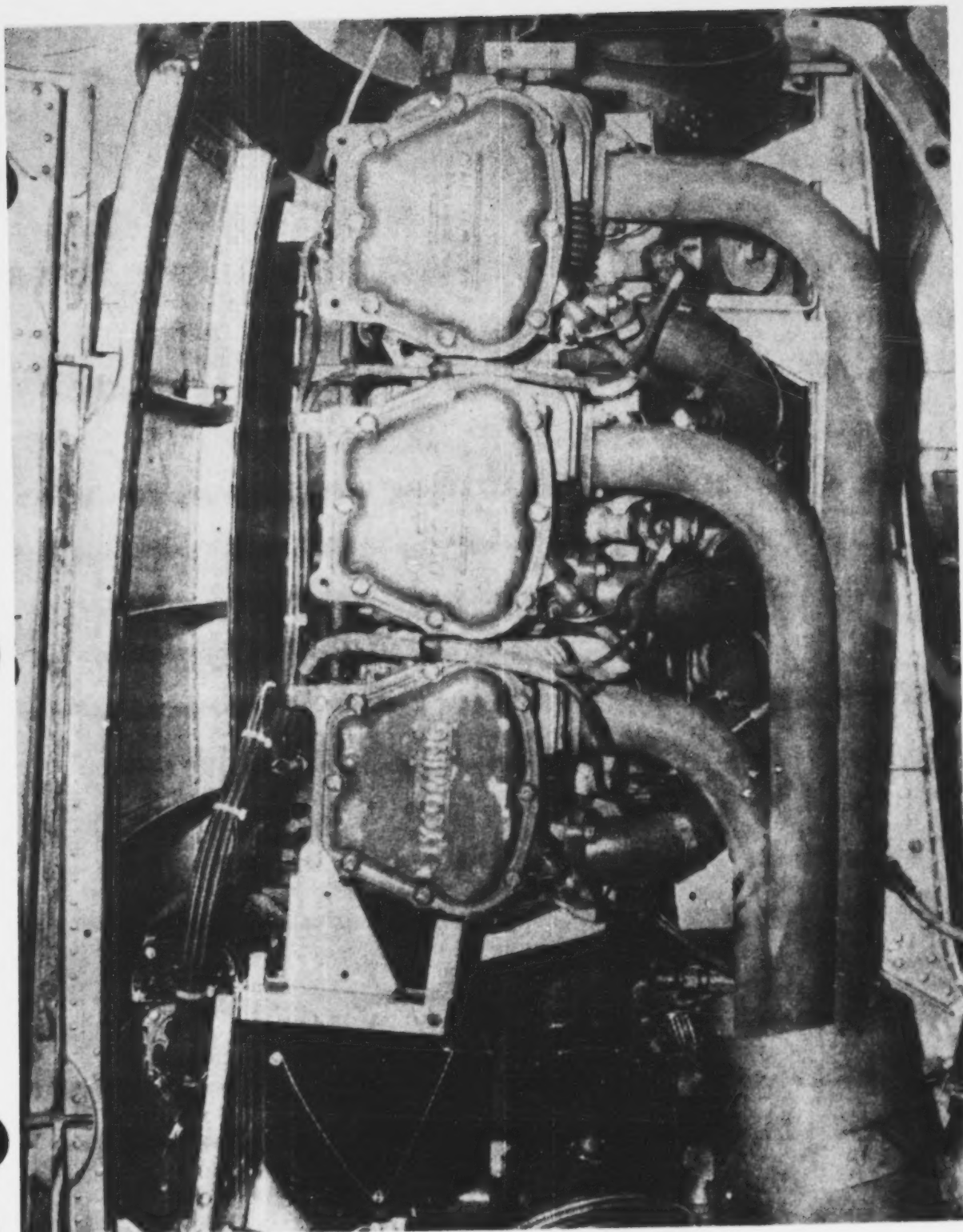


Figure 5-39C. 0-480-1B Engine Harness Installation

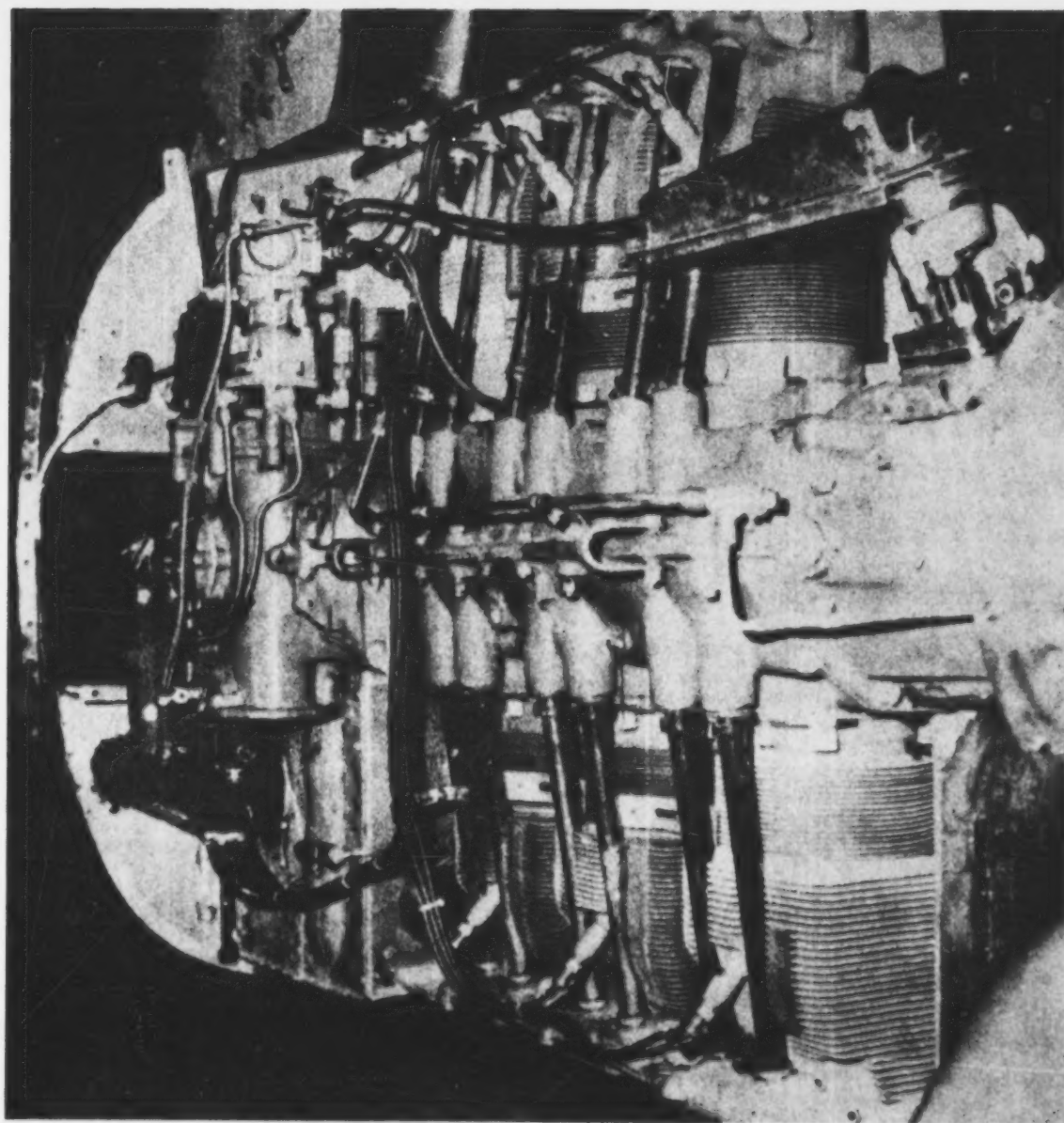


Figure 5-39D. 0-480-3A Engine Harness Installation

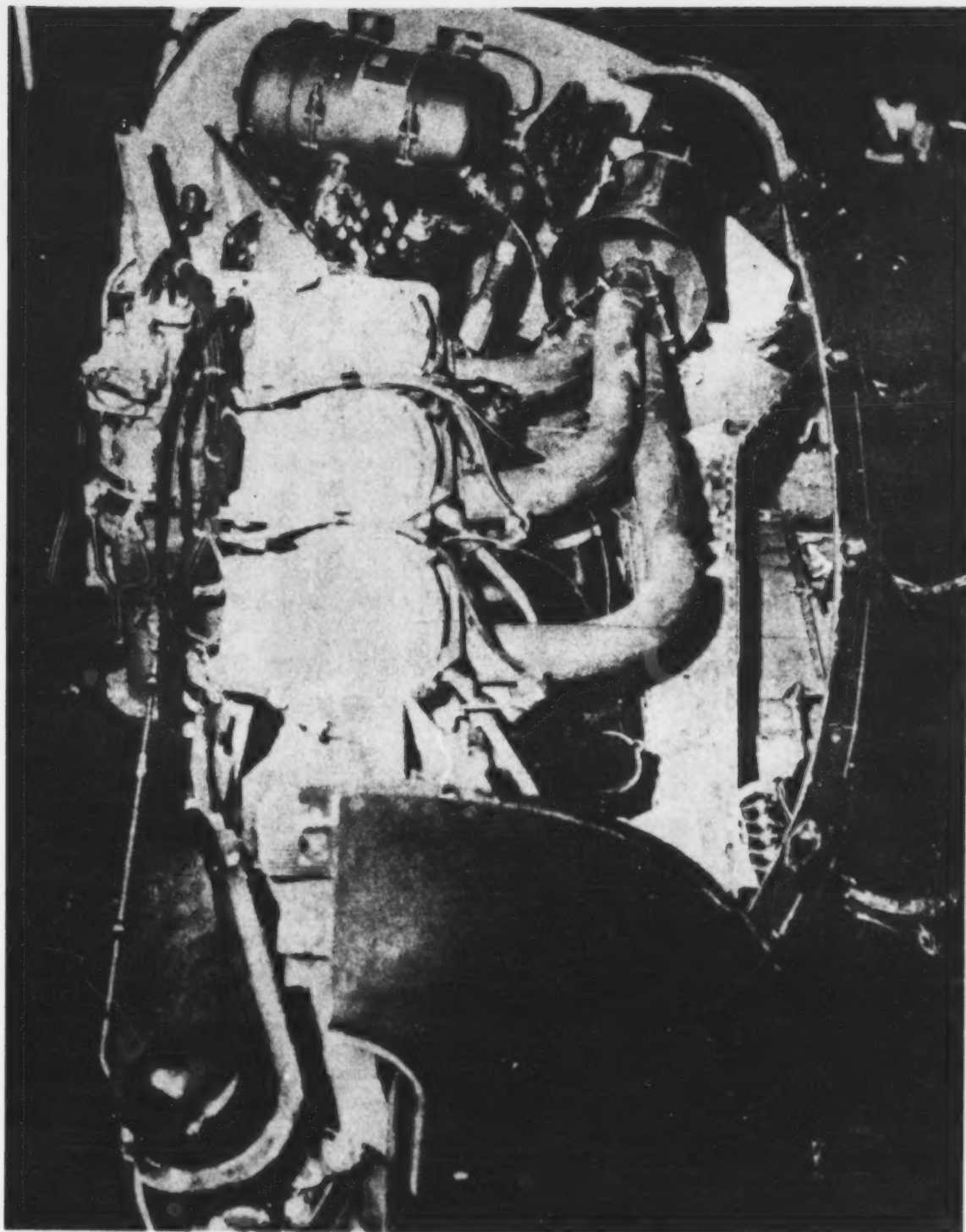


Figure 5-39f. O-480-3A Engine Harness Installation

5-167F. REASSEMBLY.

NOTE

Spare part leads are supplied in three(3) lengths. Use lead which is listed in Table 5-2.

(1) Cut lead assembly to the length given in table 5-2. Move coupling nut back on lead assembly and measure required length from outer end of ferrule at spark plug end. (See figure 5-39J). Mark ferrules on spark plug end of leads with a metal stamp, scribe or rubber stamp to correspond with correct cylinder number.

(2) Starting at spark plug location, thread new cable thru grommets and clamps as necessary for correct routing of cut end of cable to magneto location. (See applicable installation drawing.)

NOTE

To minimize twisting of ferrule when attaching coupling nut to the spark plug, the ferrule shoulder should be lubricated.

(3) Using scissors, carefully remove 1.250 inch of outer braid from end of lead. See figure 5-39I.

CAUTION

Use care not to nick or cut insulation when removing braid.

(4) Using a scribe or similar pointed tools, un-braid 3/8 inch of braided shielding. Wrap single thickness of electrical tape around unbraided strands to facilitate insertion of lead end through hole in cable outlet plate.

(5) Remove cable outlet plate from magneto. Support plate securely, and, using suitable cutting pliers, split and remove eyelets from leads adjacent to lead being replaced. When splitting eyelet, make certain that wire strands are not cut. Removal of eyelets on adjacent leads will allow grommet to be pulled away from outlet plate to facilitate insertion of new lead.

(6) Pass the taped end of new lead through hole in outlet plate. Remove electrical tape from lead and install tapered end of ferrule under the un-braided strands of shielding. Form strands of shielding evenly around tapered ferrule as shown in figure 5-39H and pull lead assembly back through cable outlet plate until ferrule binds in the outlet well. Position the 11-7074 ferrule seating tool (figure 5-39J) over the wire and firmly seat the ferrule by tapping the seating tool with a hammer or by using an arbor press.

(7) Measure 1/2 inch from top of ferrule and strip remaining insulation from wire. See figure 5-39K.

(8) Insert 11-7073 needle (figure 5-39L) thru small hole of grommet and over stripped end of wire. See figure 5-39M. Slide grommet down needle until it seats tightly against the tapered ferrule. See figure 5-39N.

(9) Cut wire 3/8 inch from top of grommet outlet. Double wire over as shown in figure 5-39O(A). Slide eyelet over doubled wire until it is firmly seated in recess of grommet outlet.

(10) Using the "AB" groove of 11-4152 crimping tool, crimp eyelet to wire. Approximately 1/32" of wire should extend from end of eyelet after crimping. See figure 5-39O(B).

NOTE

If the 11-4152 crimping tool is not available, a satisfactory connection can be made by soldering with a non-corrosive solder. After soldering, clean solder joints using denatured alcohol.

5-167G. LUBRICATION.

Before coupling harness assembly to magneto, spray entire face of the grommet with a light coat of plastic mold spray. This will prevent cable outlet grommet from sticking when it is necessary to remove the harness from the magneto distributor block. (Item 72, table 1-8.)

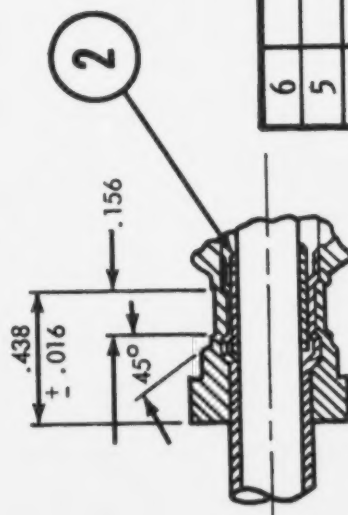
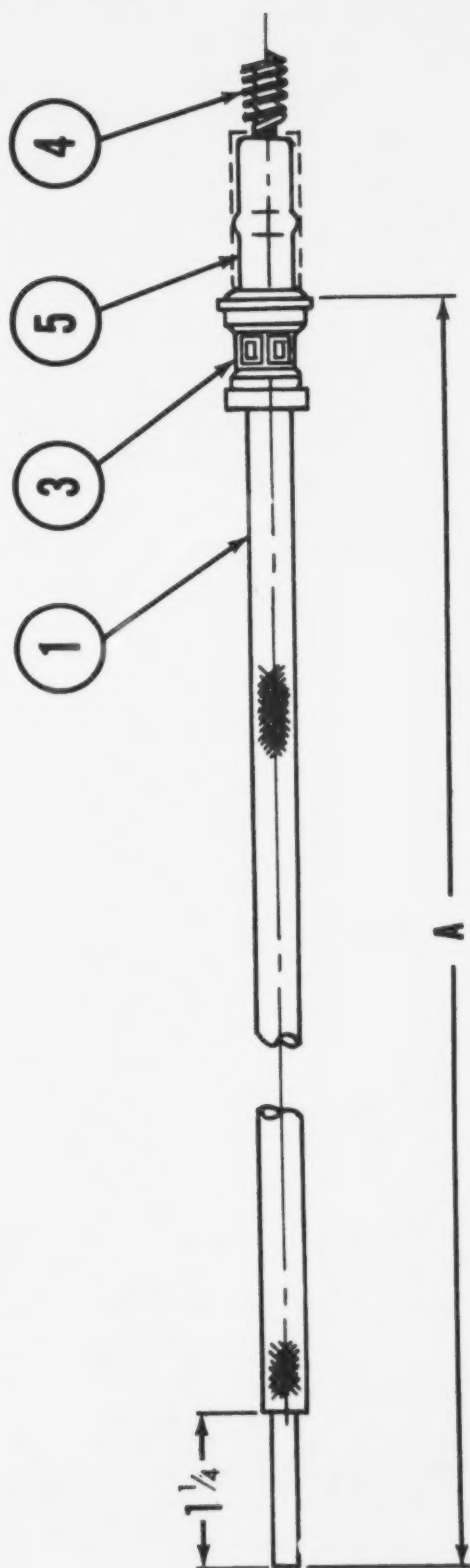
5-168. SPARK PLUGS.

5-169. The engine is equipped with two spark plugs for each cylinder. Each spark plug is of the shielded, ceramic-insulated, one-piece type, having two ground electrodes.

CAUTION

Handle spark plugs carefully, as their condition is most important to engine performance. It is essential that the proper type of spark plug be used in the engine, and that it is in good condition and properly installed.

a. Operational check. After installation of spark plugs, operate engine in accordance with TM 55-1510-201-10, and accomplish an ignition system check. Check for excessive rpm drop, rough operation, and manifold pressure differential at the ignition system check speed. In



ITEM	QTY REQD	PART NUMBER	TERMINAL	DESCRIPTION
6	1	10-320468	SLEEVE	
5	1	10-320473	SPRING	
4	1	10-32326	FERRULE	
3	1	10-320389	FERRULE, GROUNDING	
2	1	10-92702-58	CABLE	
1	SEE TABLE	10-320457		

Figure 5-39L. Cable Assembly

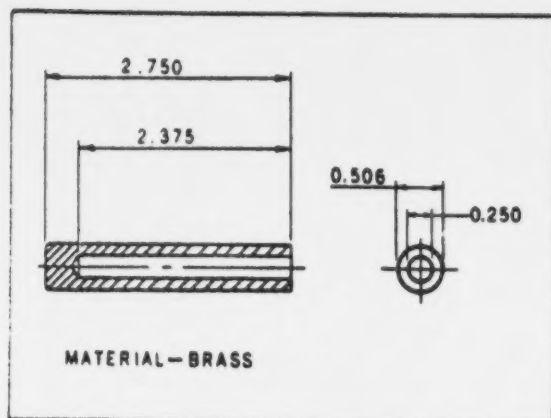


Figure 5-39J. 11-7074 Ferrule Seating Tool

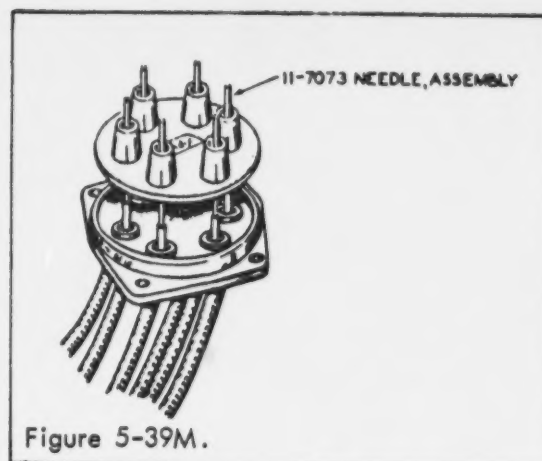


Figure 5-39M.

Installing Grommet Over Lead Assembly

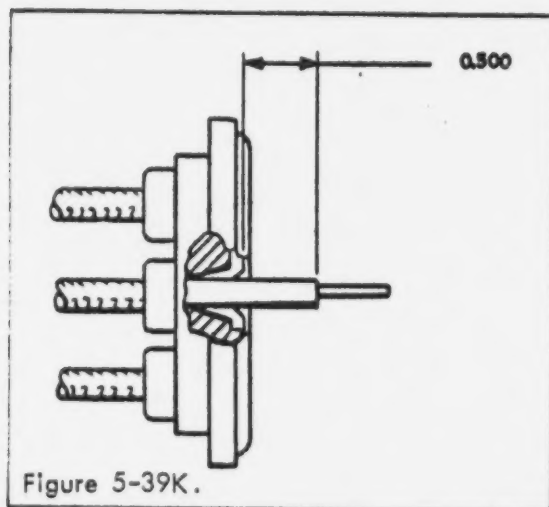


Figure 5-39K.

Measuring Wire from Top of Ferrule

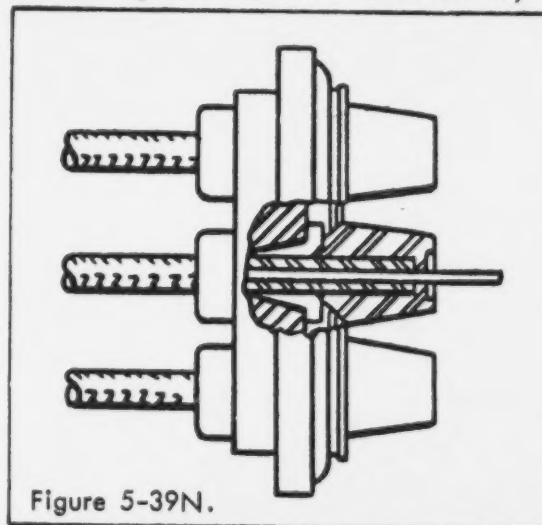


Figure 5-39N.

Lead Assembly Installed in Grommet

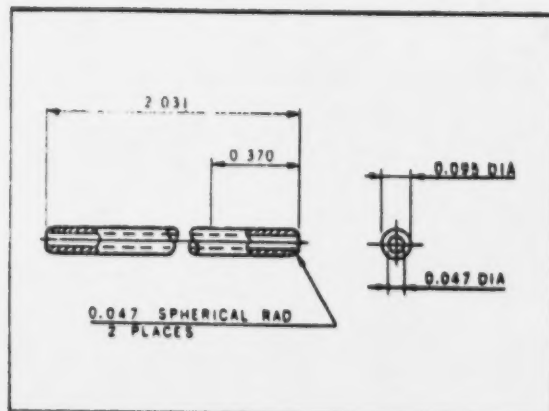


Figure 5-39L. 11-7073 Needle

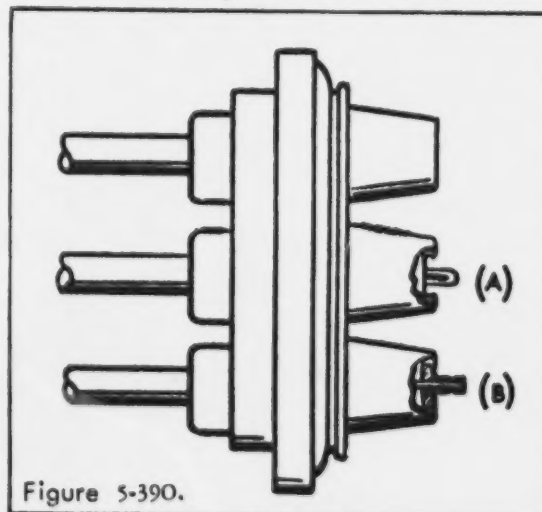


Figure 5-39O.

Wire Doubled Over for Installation of Eyelet

the event of unsatisfactory operation, a cold cylinder check (paragraph 5-31), engine analyzer check, or other adequate means of detection must be accomplished to determine if any of the installed spark plugs are malfunctioning. If malfunctioning is detected the applicable ignition lead or leads must be given a high voltage test by the assigned maintenance level.

NOTE

Only defective spark plugs are to be removed and replaced.

b. Removal. (1) Open engine cowling doors.
(2) Remove spark plug lead from spark plug using a suitable wrench. Take care not to allow elbow to turn or wrench to slip.

(3) Carefully withdraw spring connector from spark plug, pulling lead straight out in line with centerline of spark plug barrel. (See figure 5-40.) Place a protector cap over spring connector.

(4) Remove spark plug using a suitable wrench.

(5) If spark plug is seized in cylinder, fabricate a conical metal funnel adapter with a hole

in apex large enough to admit a spark plug. (See figure 5-41.)

(6) Place funnel adapter over and around spark plug. Enter funnel of CO₂ bottle into funnel adapter, and release carbon dioxide to chill and contact spark plug. Break plug loose with a wrench.

NOTE

A warm cylinder head at time carbon dioxide is applied will aid in the removal of an excessively seized spark plug. If a spark plug is sheared in attempted removal, the cylinder must be replaced by the assigned maintenance level.

(7) Identify spark plugs when removed from engine by placing in rack marked with cylinder numbers. This will assist in identifying cylinders that are near failure.

c. Inspection. (1) Inspect removed spark plugs before cleaning to determine cylinder condition and to determine if engine maintenance is required. Proceed as follows:

(a) Inspect firing end of spark plug for excessive carbon buildup.

(b) Inspect firing end of spark plug for oil.

(c) Inspect electrodes and ceramic insulators for cracks.

(d) Inspect center electrode for copper runout. If copper runout is noted, cylinder from which spark plug has been removed must be replaced by assigned maintenance level, as this indicates that temperature in cylinder has exceeded 1981°F. Inspect engine to locate reason for excessive temperature. Check oil filter for metal particles. (Refer to paragraph 5-137.) An engine with spark plug copper runout on more than 25 percent of the cylinders must be replaced by assigned maintenance level.

(e) When a spark plug has not been firing, locate and correct fault before further engine operation.

(f) After completion of spark plug inspection, treat spark plugs with corrosion preventive (item 8, table 1-8), then install in a locally manufactured wood or metal rack with suitable cover to eliminate dirt, dust, moisture, and possibility of damage to spark plugs while transporting or handling.

(g) When spark plug malfunction occurs between periodic inspections, perform an engine analyzer or cold cylinder check (paragraph 5-31) to locate defective spark plugs.

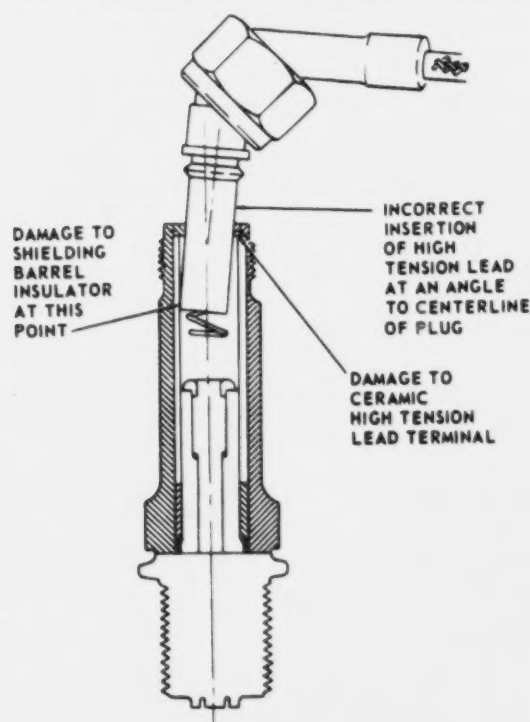


Figure 5-40. Removing spark plug lead

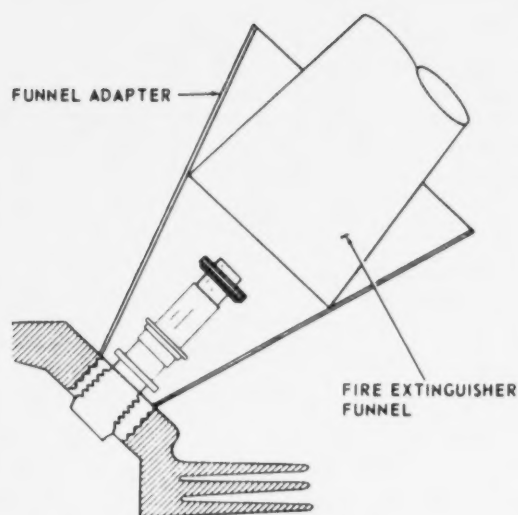


Figure 5-41. Removing seized spark plug

NOTE

Only defective spark plugs are to be removed, reconditioned, and replaced (or replaced with new or reconditioned spark plugs from supply if necessary).

(2) To ensure optimum operation of spark plugs, inspect spark plugs before installation as follows:

(a) Ensure spark plug is an approved type for use in engine.

(b) Check for evidence of rust preventive compound on spark plug exterior, core, and interior of barrel end of spark plug. If rust preventive compound is evident, remove by cleaning with dry cleaning solvent (item 6, table 1-8) applied with brush, then dry using filtered, compressed air.

(c) Check for nicks, damaged threads, or indication of cracks in insulator.

(d) Check barrel end of spark plug for rust at center electrode contact, and for foreign material which would result in poor contact. Remove foreign material with dry, compressed air.

(e) Check that copper gaskets are serviceable. Replace any which have been flattened, scored, dented, or distorted. When a thermocouple gasket is used, no additional gasket is required.

d. Cleaning. Before installation of spark plugs in cylinders, clean helical coil inserts or spark plug bushings to ensure insertion of sparkplugs using fingers only. The method of cleaning threads is different, hence the following procedure must be used.

(1) Clean helical coil insert threads with a wire brush in conjunction with a power tool.

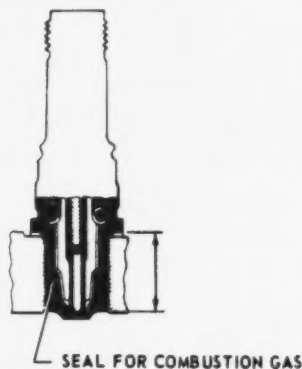
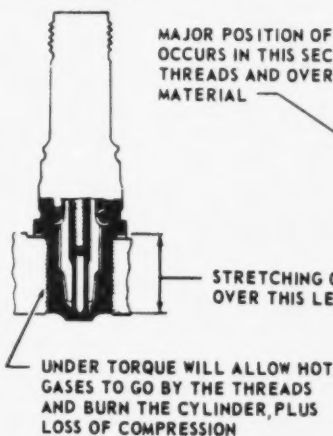
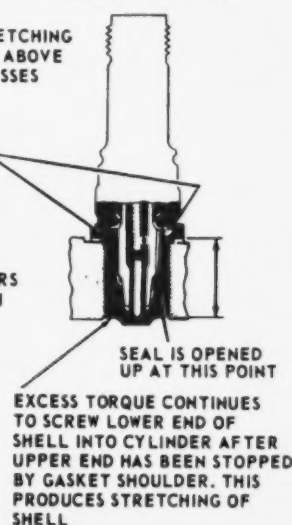
INSTALLATION WITH
NORMAL TORQUEINSTALLATION WITH
UNDER TORQUEINSTALLATION WITH
EXCESSIVE TORQUE

Figure 5-42. Effects of torques applied to spark plugs

CAUTION

The brush must be of a type which does not disintegrate with use, causing bristles to fall into the combustion chamber. The design of the brush and the technique used should be such as to preclude the removal of material from the helical coil insert, or from the cylinder head surrounding the insert. Special emphasis must be placed on the spark plug gasket seating surface, since removal of material from this location will cause combustion leakage with subsequent damage to the cylinder head. Normally only light application of a power-operated brush will be required to clean an insert. The insert must be checked for loose ends on the combustion chamber side, since a loose end may glow during engine operation, causing pre-ignition and subsequent cylinder failure.

- (2) Clean brass or stainless steel 18 mm bushing threads with a suitable tap.

NOTE

Move piston from top center position before inserting tap into bushing.

- (3) Fill between flutes on tap with clean grease (item 62, table 1-8), or equivalent, to prevent dropping hard carbon or other material into combustion chamber. Align tap with bushing by sight where possible, and start by hand until there is no possibility of tap cross-threading in bushing.

NOTE

On some installations, it may be necessary to use a short length of hose slipped over the square end of the tap to facilitate starting tap into bushing.

- (4) Screw tap into bushing to a depth sufficient to ensure that full tap cutting thread diameter reaches bottom bushing thread. The taps specified will remove carbon and combustion deposits from the bushing threads, which should not remove bushing material unless the pitch diameter of the threads has contracted due to shrinkage or some other unusual condition. If the bushing is loose in the cylinder, or threads are cross-threaded or otherwise seriously damaged, the cylinder must be replaced by the assigned maintenance level. To eliminate possible spark plug

gap fouling at time of spark plug installation, the spark plug gasket seating surfaces must be thoroughly cleaned using a clean cloth and naphtha (item 16, table 1-8).

- (5) Remove spark plugs from shipping container. Vapor degrease spark plugs with trichlorethylene (item 71, table 1-8), or equivalent, for 1 to 3 minutes. A longer period is not harmful. Vapor degreasing is desirable to clean spark plugs and remove any accumulated moisture. After inspecting electrode gap, (refer to TB 55-2925-200-25) bomb check each spark plug, using servicing kit, FSN 4910-786-9271, at 150 psi.

- (6) Observe spark plug to ensure that a steady spark occurs at electrodes. Reject any spark plug that fails to fire steadily at 200 psi or shows any indication of firing below electrodes.

e. Installation. For proper installation in the cylinder, a spark plug must be correctly inserted and tighten to the proper torque. Insert by screwing the spark plug into the cylinder bushing by hand until the gasket is contacted. Insertion in this manner indicates undamaged threads. Tighten the spark plug in the cylinder bushing, against the seating gasket, sufficiently to ensure a gas-tight seal. Effects of various torques are shown in figure 5-42. When installing the spark plug, the pull applied at the end of the wrench overcomes friction between the threads of the plug and those of the bushing in which the spark plug is being installed, and the force remaining after overcoming thread friction compresses the gasket positioned between the spark plug seat and the bushing. Be certain that the gasket is compressed enough to ensure a gas-tight seal. Compression of the gasket beyond the amount necessary to accomplish this seal will impose an overload on that section of the spark plug immediately below the plug gasket seat; that is, at the top one or two threads of the plug. This overload stretches the threads and results in a dangerous loosening of the spark plug component parts. (See figure 5-42.) The magnitude of torque required is influenced greatly by the amount of friction (depending on fit, smoothness of threads and lubrication) between the spark plug threads and the bushing of helical coil threads. If the spark plug can be inserted into the cylinder with comparative ease, using the fingers, this indicates good threads. In this case, a small additional torque will suffice to compress the gasket enough to produce a good seal. If the amount of torque required to insert and tighten a spark plug with bad threads is applied in installing a spark plug with good threads lubricated with anti-seize compound, excessive pressure on the gasket will result. This excessive pressure

might compress the gasket out of shape and distort and stretch the spark plug shell to a degree where breakage of the shell would result when the spark plug was subsequently removed or installed. Furthermore, the spark plug shell might be distorted to such an extent as to render the spark plug unserviceable because of loss of gas-tightness or injury to core insulator. The ultimate result might be a blown-out center electrode or core insulator. The thread finishes and fits of aircraft spark plugs and bushings of helical coil inserts are held within exacting tolerances, and the spark plug threads, except on helical coil or stainless steel inserts, must be coated with antiseize compound before installation. If the threads have not been nicked, corroded, burred or cross threaded, the thread friction is low, and the spark plug can be inserted all the way into the bushing or helical coil insert with the fingers.

(1) Coat first three threads from electrode end of plug lightly with lubricating oil (item 2, table 1-8).

NOTE

Antiseize compound will not be used on spark plugs to be installed in aircraft

engines. Spark plugs having rust preventive compound on threads will not require any type of lubricant.

(2) Visually inspect condition of spark plug insert, and ensure that top of spark plug hole is clean and smooth.

(3) Screw spark plugs into cylinder bushings by hand until gasket is contacted, then tighten to a torque of 360 to 420 inch-pounds.

(4) Clean high-tension lead terminals sleeve contact and integral seal with a cloth moistened with dry cleaning solvent (item 6, table 1-8) to remove any trace of dirt or grease that may be present. Replace cracked terminal sleeves.

(5) Apply a light coating (less than 1/16-inch) of insulating and sealing compound (item 72, table 1-8) to outer surface of terminal sleeve and integral seal. Apply small amount to contact spring. Application of compound to terminal assembly must be accomplished with a small, clean, dry brush to ensure cleanliness.

(6) Install spark plug lead terminal and tighten, making sure that spark plug lead elbow does not turn as nut is tightened. Tighten nut to a torque of approximately 120 inch-pounds.

(7) Close engine cowl doors.

SECTION VIII COOLING SYSTEM

5-170. DESCRIPTION.

5-171. The engine is pressure cooled by air which enters the front of the engine cowl and is directed by baffles around the cylinders. Augmenter tubes are used to induce airflow through the engine compartment and to evacuate heated air. This eliminates the necessity for controllable cowl flaps.

5-172. ENGINE COWLING.

5-173. Similar engine cowlings completely enclose both engines on all configurations of the aircraft. The engine cowl consists of upper and lower cowl sections. The upper and lower cowl sections are rigidly attached to the firewall at the rear and to each other in the front. The lower section is also attached to the front end of the engine mount. Large doors are located

on both sides of the engine cowl. These doors attach to the upper cowl by hinges and, when in the closed position, to the lower cowl by quick release fasteners. These doors provide access to almost all engine components. It is normally unnecessary to remove the engine cowl except during engine change.

a. Removal. (1) Ensure that ignition and battery switches are in OFF position.

(2) Remove oil cooler access cover.

(3) Remove bolts securing oil cooler to cowl former.

(4) Open both engine cowl doors.

(5) Remove crankcase breather line.

(6) Remove inside and outside screws securing upper cowl to firewall.

(7) Remove screws and bolts on each side of nose cowl former securing upper and lower cowl sections together.

(8) Remove upper cowl, including doors, from engine.

- (9) Remove lower cowl access panel.
- (10) Loosen clamps securing flexible duct to induction air valve.

NOTE

On U-8D, U-8G, and RU-8D aircraft, the flexible duct is located on the front of the air induction valve. On U-8F aircraft, it is located behind the air induction valve.

- (11) Disconnect all drain lines from bottom of lower cowl.
- (12) On U-8F aircraft, disconnect actuator rod from filter door actuator and warm air control rod from induction air valve arm.
- (13) Remove screws securing lower cowl to firewall.
- (14) Support lower cowl and remove bolts securing lower cowl to front of engine mount.
- (15) Remove lower cowl from engine.

NOTE

All engine cowlings shall be installed during ground operation of engine.

- b. Cleaning. Clean engine cowl in accordance with paragraph 1-159.
- c. Inspection. (1) Inspect engine cowl for

cracks, dents, and distortion.

- (2) Inspect for loose, sheared, and missing rivets.

- (3) Inspect hinges and fasteners for cracks.
- (4) Inspect decals for legibility.

d. Installation. (1) Position lower cowl on engine and install bolts securing lower cowl to front of engine mount.

- (2) Install screws securing lower cowl to firewall.

(3) On U-8F aircraft, connect actuator rod to filter door actuator and warm air control rod to induction air valve arm.

- (4) Check adjustment of alternate induction air control and alternate warm air control in accordance with paragraph 5-74.

- (5) Connect all drain lines.

(6) Install flexible duct on induction air valve and secure with clamps.

- (7) Install upper cowl on engine and install screws and bolts on each side of nose cowl former, securing upper cowl to lower cowl.

(8) Install inside and outside screws securing upper cowl to firewall.

- (9) Install crankcase breather line.

(10) Install bolts securing oil cooler to cowl former.

- (11) Install oil cooler access cover.

- (12) Close engine cowl doors and secure.

SECTION IX CARBURETORS AND FUEL INJECTION

5-174. DESCRIPTION.

5-175. All engines installed on the U-8D, U-8G, and RU-8D aircraft are equipped with car-

buretors. Fuel injection is used on engines installed on the U-8F aircraft. For troubleshooting procedures for the carburetor and fuel injection pump, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Low power; improper idling; improper acceleration.	Incorrect throttle control linkage adjustment.	Adjust control linkage so that movement of flight compartment controls result in corresponding correct movement of throttle levers. (Refer to paragraph 5-194 or 5-202.)
Failure to start; rough running; low power; improper idling; improper acceleration.	Internal carburetor trouble. (U-8D, U-8G, and RU-8D) Defective fuel injector pump (U-8F).	Replace carburetor. (Refer to paragraph 5-177.) Replace fuel injector pump. (Refer to paragraph 5-181.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Improper idling	Incorrect carburetor idle mixture adjustment (U-8D, U-8G, and RU-8D).	Adjust carburetor idle mixture. (Refer to paragraph 5-177.)
	Incorrect idle speed adjustment of fuel injector pump (U-8F).	Adjust idle speed of fuel injector pump (Refer to paragraph 5-177.)

5-176. CARBURETORS. (U-8D,U-8G,RU-8D)**NOTE**

5-177. Carburetion is furnished by a single-barrel, pressure-type, Bendix Model PSH-7BD carburetor (2, figure 5-43). The carburetor is horizontally mounted and incorporates an air-flow power enrichment valve and an auto mixture control unit.

a. Removal. (1) Open engine cowling doors.
(2) Remove bottom engine cowling access door.

(3) Disconnect throttle and mixture controls from carburetor (2, figure 5-43).

(4) Ensure fuel selector valve handle is in OFF position.

(5) Disconnect fuel lines from carburetor (2). Cap or plug fuel lines.

(6) Remove air blast tube from altitude compensator.

(7) Cut lock wire and remove bolts (5) securing carburetor air valve (7) to carburetor (2).

(8) Cut lock wire and remove nuts (4) and washers (3) securing carburetor (2) to air inlet adapter elbow.

(9) Remove carburetor (2) and gasket (1).

(10) Cap or plug all fuel openings.

(11) Install covers on openings in body of carburetor.

b. Inspection. (1) Inspect carburetor for cracks in mounting flanges.

(2) Inspect carburetor for evidence of leakage.

(3) Inspect carburetor fuel strainer. (Refer to step h.)

c. Installation. (1) If a new carburetor is to be installed, remove fittings from old carburetor.

(2) Coat upper threads of fittings with thread compound (item 44, table 1-8) and install fittings on new carburetor.

CAUTION

Ensure that threads of fittings are free of nicks, burrs, or other irregularities. Use caution when installing fittings to prevent introduction of metal shavings or thread compound into the carburetor.

When a new or rebuilt carburetor is installed, it is necessary to fill the fuel section of the carburetor with fuel and let stand for 2 hours. Prior to starting the engine, place the throttle and mixture controls forward, operate the booster pump, and flush the carburetor. The soaking period is necessary to condition the fuel diaphragm for proper carburetor operation.

(3) Remove covers from openings in body of carburetor (2, figure 5-43).

(4) Install gasket (1) and position carburetor (2) over studs of air inlet adapter elbow.

(5) Install washers (3) and nuts (4). Secure nuts with lock wire.

(6) Install bolts (5) securing carburetor air valve (7) to carburetor (2). Secure bolts with lock wire.

(7) Install air blast tube on altitude compensator.

(8) Remove caps and plugs from fuel lines and connect fuel lines.

(9) Connect throttle and mixture controls to carburetor.

(10) Operate fuel boost pump and check all fittings on carburetor for leaks.

(11) Check for full travel of throttle and mixture controls. Adjust as required in accordance with paragraphs 5-194 and 5-198.

(12) Place the mixture control in "RICH" and the throttle in the "WIDE OPEN" position.

(13) Remove the 1/8 inch pipe plug from the bottom of the regulator cover.

(14) Operate the boost pump until clean, oil-free fuel flows from the pipe plug opening.

(15) Replace the 1/8 inch plug, and continue pumping fuel to the carburetor until oil-free fuel flows from the discharge nozzle.

(16) Place the mixture control in "IDLE CUT-OFF" and shut off the fuel supply. Leave the carburetor soak for a 2 hour period before operating the engine.

(17) A two hour soak period is desired to condition the fuel diaphragms, that is, restore them

to the pliable condition they were in when the carburetor was calibrated. This is particularly important in regard to making a final idle adjustment. If it is necessary to operate the aircraft without the full two hour carburetor soak period the desired cruise metering may be erratic and the initial idle adjustment should be considered temporary and an idle readjustment will be necessary.

CAUTION

The above procedure is the only recommended method of soaking a new carburetor. The practice of soaking the carburetor by submersion in a pail of gasoline is definitely injurious to the air diaphragms as it allows fuel to come into direct contact with the air diaphragms, removing the vinyl coat-

ing from the diaphragms and causing them to become stiff after drying out, upsetting the metering qualities of the carburetor, and premature diaphragm service life.

(18) Install bottom engine cowling.

(19) Close engine cowling doors.

d. Maintenance Operational Check. After carburetor installation, a fuel system leak check should be accomplished. Fuel leaks or pressure drops will affect metering of the carburetor. Accomplish leak checks as follows:

(1) Place mixture control lever in IDLE CUT-OFF position.

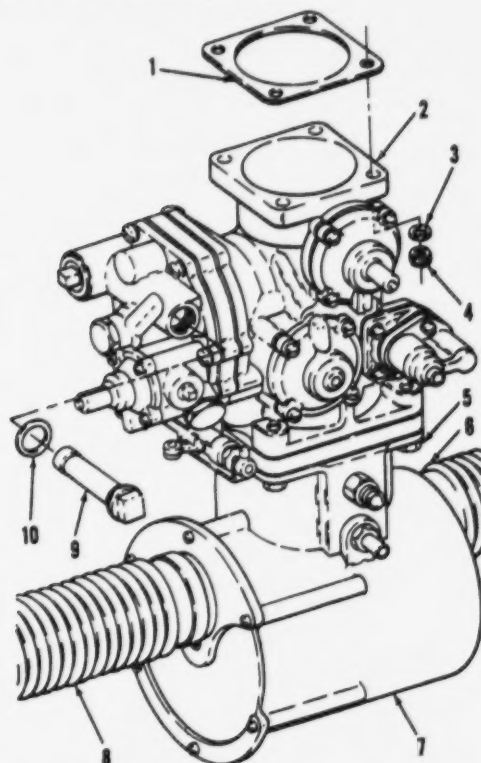
(2) Place fuel selector handle and fuel boost pump switch in ON position.

(3) Place fuel selector handle and fuel boost pump switch in OFF position.

(4) Observe fuel pressure gage indication. If

fuel pressure does not drop more than 2 psi in 15 seconds, fuel system is satisfactory. If an excessive drop is noted, check the following for leaks:

- (a) Carburetor gaskets, plugs, and connections.
- (b) Fuel lines and hoses.
- (c) Fuel boost pump.
- (d) Primer system.
- (e) Fuel selector valve.
- (f) Carburetor regulator valve.
- (5) Place fuel selector handle and fuel boost pump switch in ON position.
- (6) Place fuel selector handle and fuel boost pump switch in OFF position.



- | | |
|------------------|-----------------------------|
| 1. Gasket | 7. Carburetor air valve |
| 2. Carburetor | 8. Flexible duct |
| 3. Washer | 9. Carburetor fuel strainer |
| 4. Nut | 10. Gasket |
| 5. Bolts | |
| 6. Flexible duct | |

Figure 5-43. Carburetor installation (U-8D, U-8G, and RU-8D)

- (7) Place mixture control lever in RICH position.

NOTE

If fuel pressure drops to zero, either the discharge nozzle or accelerator pump is leaking. The discharge nozzle and accelerator pump are connected to the same fuel passage. Since the accelerator pump is almost trouble-free, check discharge nozzle first.

- (8) Place mixture control lever in IDLE CUT-OFF position.

e. Idle mixture and idle speed adjustment.
(1) Start engine in accordance with applicable operator's manual (-10).

NOTE

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- (2) Run engine until oil and cylinder temperature indicators read normal.
- (3) Perform magneto drop check. If dropoff exceeds 125 rpm, check for fouled spark plugs. If dropoff is normal, proceed with adjustment.
- (4) Close throttle lever to idle engine at approximately 600 rpm. If rpm increases appreciably after a change in idle mixture during steps e through g below, readjust idle speed to 600 rpm. (See figure 5-44.)
- (5) When the idle speed has been stabilized, move mixture control lever with a smooth, steady pull into IDLE CUT-OFF position, and observe tachometer indicator for any changes during leaning process.

CAUTION

Exercise caution to return mixture control lever to FULL-RICH position before rpm can drop to a point where engine cuts out. An increase of more than 10 rpm while leaning out indicates rich idle mixture. An immediate decrease in rpm (if not preceded by a momentary increase) indicates idle mixture is too lean.

- (6) If steps d and e above indicate that idle adjustment is too rich or too lean, turn idle

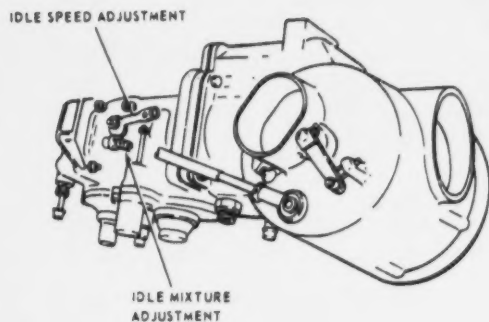


Figure 5-44. Idle speed and mixture adjustment

mixture adjustment (figure 5-44) one or two notches in direction required for corrections (counterclockwise for enriching; clockwise for leaning) and check this new position by repeating steps d and e above.

(7) Make additional adjustments as necessary until a check with steps d and e above results in a slight momentary increase in rpm. Each time adjustment is changed, run engine up to 2000 rpm to clean spark plugs before proceeding with rpm check. At sea level normal idle speed setting is 600 rpm.

(8) Stop engine in accordance with applicable operator's manual (-10).

f. Discharge nozzle limiter adjustment. If engine roughness occurs in the off-idle range and all other probable causes for roughness have been eliminated, the discharge nozzle may be adjusted on carburetors incorporating a discharge nozzle adjustment limiter as follows:

(1) Make normal idle speed and mixture adjustment in accordance with step e.

(2) With engine oil temperature and cylinder head temperature still in normal range, make mixture checks in the 1200 to 1500 rpm range and observe for maximum rpm rise.

(a) The mixture check must be made with the propeller control in full low pitch (high rpm) and with the aircraft headed into the wind. Manually lean the fuel flow by pulling the mixture control slowly toward idle cut-off. As the fuel flow is being leaned, observe for maximum momentary rpm rise which should occur just before the rpm starts to fall off. Immediately return the mixture control to full rich to prevent the engine from dying.

(b) If an rpm rise occurs, the carburetor setting is on the rich side of best power mixture.

(c) If there is not an rpm rise, the carburetor setting is at or leaner than best power mixture.

NOTE

The adjusting screw contains a spring-loaded ball, and the sleeve has internal splines to provide a lock for the adjustment and notch measurement of the amount of adjustment being made.

(3) If the mixture checks indicate a poor mixture setting, adjust the discharge nozzle to get a maximum rise not to exceed 50 rpm in the off-idle range, or until smooth engine operation is restored (see figure 5-45).

(a) To enrich the off-idle range, insert a screwdriver into the end of the discharge nozzle adjustment locking cap and turn the adjusting screw in a counterclockwise direction one notch at a time until the desired engine operation is obtained.

(b) To lean the off-idle range, turn the adjusting screw in a clockwise direction one notch at a time until the desired engine operation is obtained.

(c) Clear the engine before each mixture check by running up to cruise power.

(d) Repeat the mixture check after each nozzle adjustment.

(4) Make mixture check at 1700 rpm and look for a 5-25 rpm rise.

(5) After the off-idle mixture has been adjusted with the discharge nozzle adjustment, it will be necessary to readjust the idle.

(a) When resetting the initial idle, use only the normal idle speed and idle mixture adjustments.

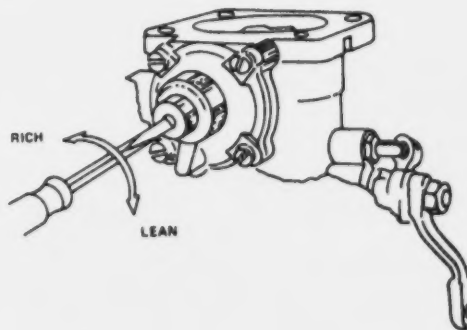


Figure 5-45. Adjusting carburetor discharge nozzle limiter

(b) The idle should be adjusted to give the lowest possible manifold pressure at the desired engine speed (usually 600 rpm).

(c) A mixture check at the idle point should give approximately a 10 rpm rise.

g. Flushing carburetor regulator (poppet) valve. (1) If dirt or foreign matter collects around poppet valve, one or more of the following conditions will occur:

(a) Engine will not stop with mixture control lever in IDLE CUT-OFF position.

(b) Mixture is too rich at idling, requiring extremely lean idle adjustment and resulting in poor acceleration and erratic cruise operation.

(c) Poor deceleration of engine, with rough operation and emission of black smoke from exhaust.

(2) Flush dirt or foreign matter from poppet valve, without removing carburetor from engine, as follows:

(a) Remove regulator needle valve plug and gasket located in center of regulator cover, just above and to right of fuel strainer cover.

(b) Remove needle valve spring and needle valve.

(c) Build up fuel pressure at carburetor and allow fuel flow to flush out needle valve seat.

(d) Remove dirt or other foreign matter from needle valve with a clean, soft, lint-free cloth or dry compressed air.

NOTE

Do not force a wire into needle valve seat or use any abrasive to polish or clean needle valve.

(e) Reassemble needle valve, needle valve spring, gasket, and regulator needle valve plug in that order.

h. Carburetor fuel strainer. The carburetor fuel strainer (9, figure 5-43) consists of a cylindrical wire mesh strainer with an attached square-head plug. The square-head plug is installed in the side of the regulator cover.

(1) Removal. (a) Open engine cowling doors.

(b) Ensure fuel selector valve handle is in OFF position.

(c) Cut lock wire and remove carburetor fuel strainer (9, figure 5-43) from carburetor (2).

(d) Remove gasket (10) from carburetor fuel strainer (9).

(2) Cleaning. (a) Clean carburetor fuel strainer with dry cleaning solvent (item 6, table 1-8).

(b) Use a soft bristle brush to remove imbedded particles from screen of carburetor fuel strainer.

CAUTION

Do not attempt to open a clogged screen with a sharp pointed instrument.

(3) Inspection. (a) Inspect carburetor fuel strainer for foreign matter, broken screen, corrosion, and distortion.

(b) Inspect soldered joints for breaks.

(c) Inspect threads of carburetor fuel strainer and port in regulator cover for malformed threads.

(4) Installation. (a) Install new gasket (10, figure 5-43) on carburetor fuel strainer (9).

(b) Install carburetor fuel strainer (9) on carburetor (2) and secure with lock wire.

(c) Close engine cowling doors.

5-178. FUEL INJECTION. (U-8F)

5-179. Fuel injection is used in all U-8F aircraft. The fuel injector pump incorporates altitude and temperature compensators for automatic mixture controls, while a power enrichment system is incorporated in the fuel system. This consists of an auto-rich solenoid which permits fuel to enter into a second injection nozzle located above the main injection nozzle. The system also includes a fuel injector pump located on the left side of the accessory section and an idle cutoff system consisting of a solenoid valve. The system offers relatively maintenance-free operation, as all mixture settings are factory-set for the life of the fuel injector pump.

5-180. FUEL INJECTOR PUMP. (U-8F)

5-181. The fuel injector pump is a multi-plunger type pump, operated by a wobble plate, the stroke of which is varied by an oil-operated servo system, controlled by a capsule responding to manifold pressure and temperature. The fuel injector pump is driven at engine crankshaft speed and is located on the left side of the engine.

a. Removal. (1) Open left side of engine cowling doors.

(2) Remove screws securing temperature bulb to supercharger air inlet housing and remove temperature bulb.

(3) Remove clamps securing temperature bulb tubing.

(4) Disconnect fuel lines from fuel injector pump.

(5) Remove nuts securing fuel injector pump to accessory section. Remove fuel injector pump and temperature bulb.

CAUTION

Use extreme care when removing temperature bulb tubing, as it may be damaged by sudden pulls or sharp bends.

b. Cleaning. Clean fuel injector pump and temperature bulb tubing with a cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect fuel injector pump for cracks and evidence of leakage.

(2) Inspect temperature bulb tubing for cracks, dents, and bends.

d. Installation. (1) Install fuel injector pump on accessory section and secure with nuts.

(2) Route temperature bulb tubing and install temperature bulb in supercharger air inlet housing.

(3) Install screws securing temperature bulb to supercharger air inlet housing.

(4) Connect fuel lines to fuel injector pump.

(5) Install clamps securing temperature bulb tubing.

(6) Close left side of engine cowling doors.

e. After installation of fuel injector pump, determine whether the engine throttle linkage operates to conform to the following conditions:

(1) Start engine in accordance with TM 55-1510-201-10.

(2) Run engine until oil and cylinder temperature indicators read normal.

(3) Perform magneto drop check.

(4) The engine must idle smoothly without symptoms of a rich or lean fuel mixture.

(5) The intake manifold pressures must be in balance and without fluctuation.

(6) The throttle control in passing through entire range, must cause butterfly in air intake to be fully open and fully closed.

f. Idle speed adjustment, retard throttle to idle stop, and then turn idle stop adjusting screw on supercharger air inlet housing to set idle rpm at 700 rpm. Turn idle adjusting screw clockwise to increase rpm and counterclockwise to decrease rpm. Stop engine in accordance with TM 55-1510-201-10.

g. Fuel injector pump too lean. A lean injector may cause backfiring, high cylinder head temperatures or high, but smooth magneto drops on both magnetos. If the magneto drop seems high, run the engine on the ground at 2600 rpm and check magnetos with the primer

on. If the magneto drop is less than with the primer off, fuel injector pump is too lean. Adjust fuel injector pump as follows:

(1) Break lead seal and lockwire and remove cap from fuel injector pump.

(2) On outside adjusting nut, mark present position with a pencil, also similarly mark inside locking nut.

(3) Each hole in the adjusting nut represents approximately four pounds of fuel at cruise or 28 pounds of fuel at climb power.

(4) To enrich fuel injector pump, turn adjusting nut counterclockwise or out an estimated number of holes. Average adjustment has been three holes. Suggest adjustment of two holes then test fly. Avoid extreme adjustments. If necessary to adjust more than five holes, then fuel injector pump should be replaced.

(5) Warm engine and check both magnetos. If magneto drop is within limits, and engine runs satisfactorily, reinstall cap and secure with lockwire.

(6) Test fly, noting cylinder head temperatures, engine performance, airspeed, and fuel consumption.

NOTE

If adjustments fail to eliminate the lean conditions, then replace fuel injector pump.

h. Fuel injector pump too rich. A rich fuel injector pump may be diagnosed by the high fuel consumption, black smoke emitting from the augmentor tubes, and possible lower cylinder head temperatures. It is relatively simple to remedy this problem in the field by making the following adjustments:

(1) Break lead seal and lockwire, and remove cap from fuel injector pump.

(2) On outside adjusting nut mark present position with a pencil, and also similarly mark the inside locking nut.

(3) Each hole in adjusting nut represents approximately four pounds of fuel at cruise, or 28 pounds of fuel at climb power.

(4) To lean fuel injector pump. Turn inside locking nut first while holding outside nut. Turn adjusting nut clockwise or in an estimated number of holes. Then hold the outside nut and turn inside nut to lock.

(5) Do not make extreme adjustments. Reinstall cap and secure with lockwire and lead seal.

(6) Warm engine and check magnetos. If high drop takes place on both magnetos, then adjustment may be too lean.

(7) Test fly noting performance, airspeed, cylinder head temperatures and fuel consumption.

NOTE

If adjustments fail to eliminate the rich conditions, then replace fuel injector pump.

5-182. FUEL INJECTION NOZZLE. (U-8F)

5-183. The fuel injection nozzle meters fuel from the fuel injector pump to the supercharger. The fuel injection nozzle is located at the top center of the supercharger air inlet housing.

a. Removal. (1) Open engine cowling doors.

(2) Disconnect fuel line from fuel injection nozzle.

(3) Remove fuel injection nozzle from supercharger air inlet housing.

(4) Remove preformed packing from fuel injection nozzle.

(5) Cap fuel injection nozzle and port in supercharger air inlet housing to prevent entry of foreign matter.

b. Cleaning. (1) Clean fuel injection nozzle and screen with dry cleaning solvent (item 6, table 1-8).

(2) Dry with filtered, compressed air.

c. Inspection. (1) Inspect fuel injection nozzle screen for cleanliness.

(2) Inspect valve in fuel injection nozzle for foreign material.

d. Installation. (1) Remove caps from fuel injection nozzle and port in supercharger air inlet housing.

(2) Install new preformed packing on fuel injection nozzle.

(3) Install fuel injection nozzle in supercharger air inlet housing.

(4) Tighten fuel injection nozzle to a torque of 30 to 45 foot-pounds.

NOTE

Do not use thread lubricant or compound on fuel injection nozzle fuel line fittings. Only clean lubricating oil may be used on these fittings.

(5) Connect fuel line to fuel injection nozzle.

(6) Close engine cowling doors.

5-184. AUTO-RICH SOLENOID. (U-8F)

5-185. The auto-rich solenoid (20, figure 5-12) allows fuel to flow to the auto-rich nozzle (18), located above the fuel injection nozzle (16). The auto-rich solenoid is located on the right side of supercharger air inlet housing (13).

a. Removal. (1) Open engine cowling doors.

(2) Cut lock wire securing electrical connector to auto-rich solenoid (20, figure 5-12). Remove electrical connector from auto-rich solenoid.

(3) Remove tubing (2) and hose (4 and 19) from auto-rich solenoid (20).

(4) Remove bolts and nuts securing auto-rich solenoid (20) to bracket (3).

(5) Remove auto-rich solenoid (20) from bracket (3).

(6) Cap openings on auto-rich solenoid (20), tubing (2), and hose (4 and 19) to prevent foreign matter from entering fuel system.

b. Cleaning. Clean auto-rich solenoid with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect auto-rich solenoid for cracks, malformed threads in ports, and evidence of leakage.

(2) Inspect electrical connector for broken wire and corrosion.

d. Installation. (1) Remove caps from openings on auto-rich solenoid (20, figure 5-12), tubing (2), and hose (4 and 19).

(2) Install auto-rich solenoid (20) on bracket (3) and secure with bolts and nuts.

(3) Install tubing (2) and hose (4 and 19) on auto-rich solenoid (20).

NOTE

Do not use thread lubricant or compound on nozzle line fittings. Only clean lubricating oil may be used on these threads.

(4) Install electrical connector on auto-rich solenoid (20) and secure with lock wire.

(5) Close engine cowling doors.

5-186. FUEL INJECTOR SOLENOID. (U-8F)

5-187. The fuel injector solenoid (7, figure 5-12) is controlled by the idle cut-off switches mounted on the center subpanel forward of the throttle controls. Turning either switch ON closes the fuel injector solenoid on the corresponding engine, which controls normal fuel flow to engine air induction system. Placing idle cutoff switch in OFF position opens the fuel injector solenoid and stops engine operation. The fuel injector solenoid is located below the auto-rich solenoid.

a. Removal. (1) Open engine cowling doors.

(2) Cut lock wire securing electrical connector to fuel injector solenoid (7, figure 5-12). Remove electrical connector from fuel injector solenoid.

(3) Remove tubing (6) and hose (4 and 15) from fuel injector solenoid (7).

(4) Remove bolts, washers, and nuts (14) securing fuel injector solenoid (7) to bracket (5).

(5) Remove fuel injector solenoid (7) from bracket (5).

(6) Cap openings on fuel injector solenoid (7), tubing (6), and hose (4 and 15) to prevent foreign matter from entering fuel system.

b. Cleaning. Clean fuel injector solenoid with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect fuel injector solenoid for cracks, malformed threads in ports, and evidence of leakage.

(2) Inspect electrical connector for broken wire and corrosion.

d. Installation. (1) Remove caps from openings on fuel injector solenoid (7, figure 5-12), tubing

(6), and hose (4 and 15).

(2) Install fuel injector solenoid (7) on bracket (5) and secure with bolts, washers, and nuts (14).

(3) Install tubing (6) and hose (4 and 15) on fuel injector solenoid (7).

NOTE

Do not use thread lubricant or compound on fuel injection nozzle line fittings. Only clean lubricating oil may be used on these threads.

(4) Install electrical connector on fuel injector solenoid (7) and secure with lock wire.

(5) Close engine cowling doors.

5-188. FUEL INJECTOR OIL SCREEN. (U-8F)

5-189. The fuel injector pump is lubricated by oil supplied from the engine oil pressure system. A fuel injector oil screen, located below and aft of the fuel injector pump, filters the oil to prevent damage to the fuel injector pump. (See figure 5-46.)

a. Removal. (1) Open left side engine cowling doors.

(2) Cut lockwire securing body of fuel injector oil screen.

(3) Remove fuel injector oil screen from engine using wrench, part No. 64914, FSN 5120-474-1957.

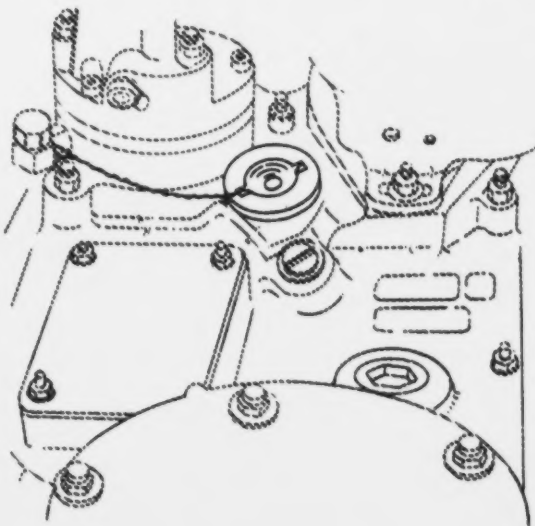


Figure 5-46. Fuel injector oil screen

(4) Remove preformed packings from fuel injector oil screen.

b. Cleaning. (1) Clean fuel injector oil screen by washing in dry cleaning solvent (item 6, table 1-8).

(2) Dry fuel injector oil screen by directing a stream of dry, compressed air across screen.

CAUTION

Do not direct airstream into fuel injector oil screen.

c. Inspection. (1) Inspect body of fuel injector oil screen for cracks and distortion.

(2) Inspect screen of fuel injector oil screen for small holes, distortion, and cleanliness.

d. Installation. (1) Install preformed packings on fuel injector oil screen.

(2) Install fuel injector oil screen on engine using wrench, part No. 64914, FSN 5120-474-1957. Torque fuel injector oil screen to 10 ft. lbs.

(3) Secure body of fuel injector oil screen with lock wire. (See figure 5-46.)

(4) Close left side of engine cowling doors.

SECTION X POWER CONTROLS

5-190. POWER CONTROLS.

5-191. The power controls for the U-8D, U-8G, and RU-8D aircraft (figure 5-47) consist of throttle, propeller, and mixture controls and linkage to inter-connect each control. The throttle, propeller, and mixture control levers are located in the control console (see figure 5-48). The power controls for the U-8F aircraft (figure 5-49) consist of throttle and propeller controls and linkage to interconnect each control. The throttle and propeller control levers are located in the control console (see figure 5-50). The control systems are similar in arrangement; each consists of flexible controls which link the control levers in the control console to the engine unit. Adjustable friction locks adjust friction on the control levers.

NOTE

Rod ends of all power controls are secured with bolts utilizing self-locking castellated nuts and cotter pins.

5-192. THROTTLE, PROPELLER, AND MIXTURE CONTROL LEVERS AND FRICTION LOCK ASSEMBLY. (U-8D, U-8G, RU-8D)

5-193. The throttle, propeller, and mixture control levers and friction lock assembly consists of a set of levers (1, 2, and 3, figure 5-48) mounted side by side on a control shaft (4). A friction lock knob (8) is provided on the engine controls to lock the control levers in any desired position and to adjust the forces required for control lever movement. The controls are locked by friction applied by spacers (6 and 7) located between the control levers. Tightening the

friction lock knob (8) increases friction, and loosening the friction lock knob decreases friction.

a. Removal. (1) Working under and behind control console, remove bolts, washers, and nuts securing rod ends to control levers (1, 2, and 3, figure 5-48).

(2) Remove radio control panel installed in instrument panel to right of control console.

(3) Remove instruments installed in instrument panel to left of control console.

(4) Remove cotter pin and pin (5) at slotted end of control shaft (4).

(5) Hold friction lock knob (8) to prevent friction lock gear (15) from turning, and unscrew control shaft (4) from friction lock gear (15).

(6) Remove propeller, throttle, and mixture control levers (1, 2, and 3).

(7) Remove spacers (6, 7, 11, 12, 13, 14, and 16) and friction lock gear (15).

(8) Remove friction lock knob (8) and worm gear (9).

NOTE

If only one control lever is to be removed, feed in a 3/16 inch rod from opposite end as control shaft is pulled out. This will prevent displacement of spacers, friction lock gear, and worm gear.

b. Cleaning. (1) Clean all metal parts of control levers and friction lock assembly with dry cleaning solvent (item 6, table 1-8).

(2) Wipe all parts dry with a clean, dry cloth.

c. Inspection. (1) Inspect control levers for cracks, wear, and hole elongation.

(2) Inspect bushings, spacers, friction lock gear, and worm gear for wear, cracks and distortion.

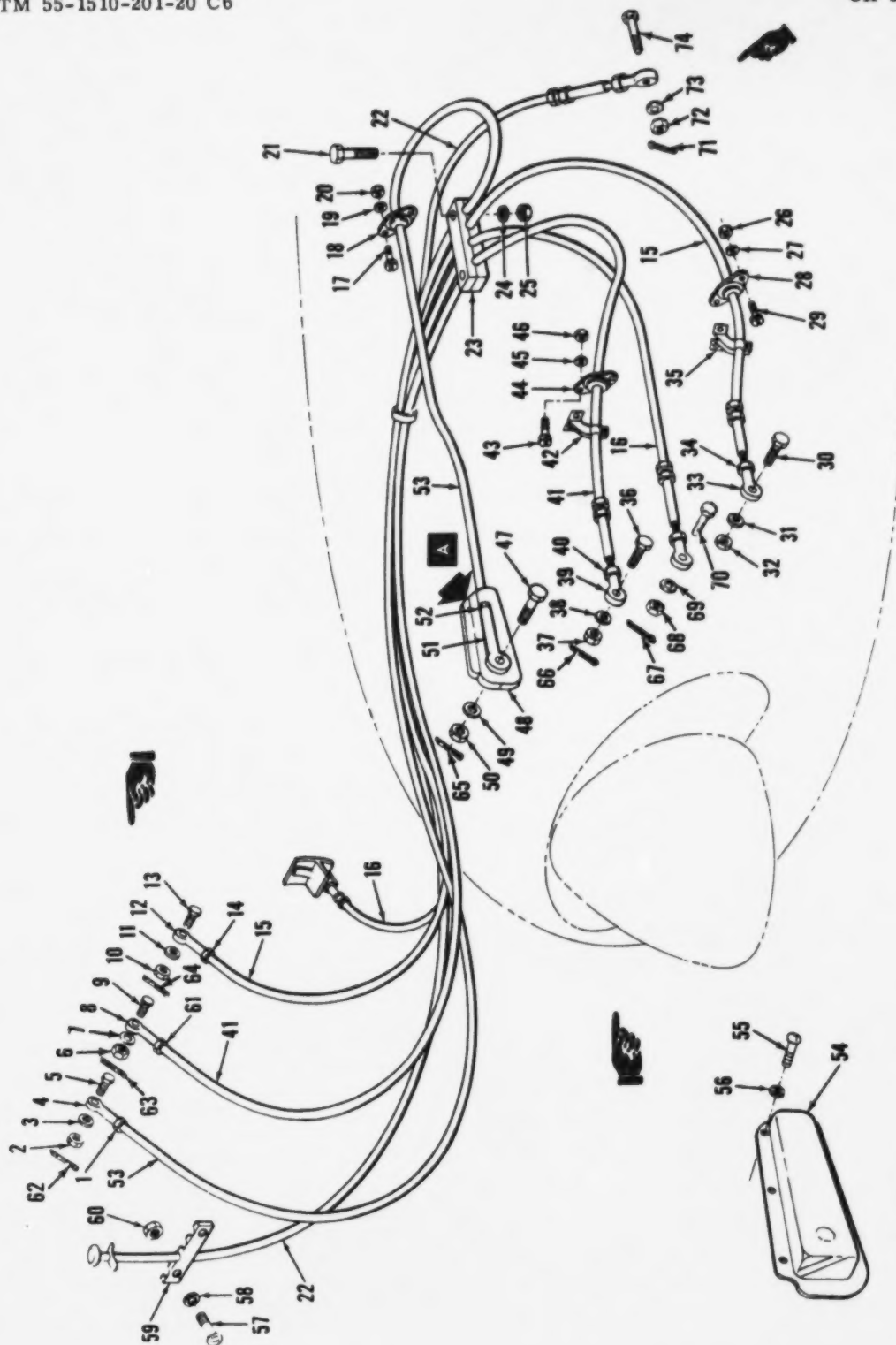


Figure 5-47. Power controls (U-8D, U-8G, and RU-8D) (sheet 1 of 2)

DETAIL A

1. Locknut	16. Alternate	30. Bolt	45. Washer	61. Locknut
2. Nut	air control	31. Washer	46. Nut	62. Cotter pin
3. Washer	17. Screw	32. Nut	47. Bolt	63. Cotter pin
4. Rod end	18. Retainer	33. Rod end	48. Governor plate	64. Cotter pin
5. Bolt	19. Washer	34. Locknut	49. Washer	65. Cotter pin
6. Nut	20. Nut	35. Bracket	50. Nut	66. Cotter pin
7. Washer	21. Bolt	36. Bolt	51. Rod end	67. Cotter pin
8. Rod end	22. Oil shutoff	37. Nut	52. Locknut	68. Nut
9. Bolt	valve control	38. Washer	53. Propeller control	69. Washer
10. Nut	23. Block	39. Rod end	54. Cover	70. Bolt
11. Washer	24. Washer	40. Locknut	55. Screw	71. Cotter pin
12. Rod end	25. Nut	41. Throttle	56. Washer	72. Nut
13. Bolt	26. Nut	control	57. Screw	73. Washer
14. Locknut	27. Washer	42. Bracket	58. Washer	74. Bolt
15. Mixture	28. Retainer	43. Screw	59. Clamp	
control	29. Screw	44. Retainer	60. Nut	

Figure 5-47. Power controls (U-8D, U-8G, and RU-8D) (sheet 2 of 2)

(3) Inspect control shaft for wear and malformed threads.

d. Repair or replacement. Repair consists of the replacement of damaged or worn parts. Ensure that all parts are clean and free of lubricant.

e. Installation. (1) Install friction lock knob (8, figure 5-48) and worm gear (9) in support (10).

(2) Install spacers (6, 7, 11, 12, 13, 14, and 16) and friction lock gear (15).

(3) Position propeller, throttle, and mixture control levers (1, 2, and 3) in support (10) and work control shaft (4) to a point where it will screw into friction lock gear (15).

(4) Hold friction lock knob (8) to prevent friction lock gear (15) from turning, and screw control shaft (4) into friction lock gear (15).

NOTE

If a 3/16-inch rod was used for removing only one control lever, rod will be forced out.

(5) Install pin (5) in control shaft (4). Secure pin (5) with a cotter pin.

(6) Install rod ends on propeller, throttle, and mixture control levers (1, 2, and 3). Secure rod ends with bolts, washers, and nuts. Tighten nuts to a torque of 20 to 30 inch-pounds.

NOTE

Ensure inner race of rod end bearings are tight against control levers to prevent shearing of bolts through vibration. Do not reuse removed nuts.

(7) Check throttle, propeller, and mixture

controls for freedom of travel throughout their entire operating range.

(8) Install instruments in instrument panel to left of control console.

(9) Install radio control panel in instrument panel to right side of control console.

5-194. THROTTLE CONTROL (U-8D, U-8G, RU-8D)

5-195. A flexible throttle control (41, figure 5-47) connects to the throttle control lever (2, figure 5-48) and the throttle valve arm on the carburetor. The throttle valve arm incorporates stops for open and closed positions. A landing gear warning horn switch is actuated by each throttle control to sound a warning horn if either or both throttle are retarded below 16 inches manifold pressure with landing gear retracted.

a. Removal. (1) Remove nut (6, figure 5-47), washer (7), and bolt (9) securing throttle control (41) to throttle control lever (2, figure 5-48).

(2) Remove screws, washers, and nuts securing warning horn cam in its mounting bracket.

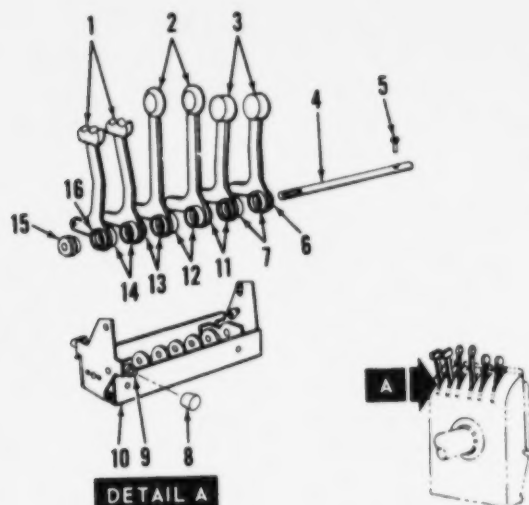
NOTE

When screw is removed, bushing in cam slot will fall free.

(3) Remove forward cabin seats and floorboards. (Refer to paragraphs 4-57 and 4-84, or 4-114 and 4-133.)

(4) Remove screws (57, figure 5-47), washers (58), nuts (60), and clamp (59).

(5) Remove center section wing leading edge. (Refer to paragraph 4-241.)



- | | |
|-----------------------------|------------------------|
| 1. Propeller control levers | 9. Worm gear |
| 2. Throttle control levers | 10. Support |
| 3. Mixture control levers | 11. Spacers |
| 4. Control shaft | 12. Spacers |
| 5. Pin | 13. Spacers |
| 6. Spacer | 14. Spacers |
| 7. Spacers | 15. Friction lock gear |
| 8. Friction lock knob | 16. Spacer |

Figure 5-48. Throttle, propeller, and mixture control levers, and friction lock assembly (U-8D, U-8G, and RU-8D)

- (6) Open engine cowling doors.
- (7) Remove clamps and grommets securing throttle control (41) to aircraft.

NOTE

When removing clamps, mark throttle control on both sides of clamps to aid in re-location. If a new throttle control is to be installed, transfer these position marks to new throttle control.

- (8) Remove nuts (25), washers (24), bolts (21), and block (23).
- (9) Remove nut (37), washer (38), and bolt (36) securing throttle control (41) to arm on engine control bracket.
- (10) Remove throttle control (41) from bracket (42).
- (11) Remove nuts (46), washers (45), and screws (43) securing retainer (44) to firewall. Remove ball-half and grommet from retainer.
- (12) Loosen lock nuts (61 and 40) and remove rod ends (8 and 39) from throttle control (41).

NOTE

When removing rod ends, count the number of turns required to remove rod ends. When installing rod ends on new throttle control, use same number of turns. Remove warning horn cam and install in same position on new throttle control.

- (13) Ensure all clamps and grommets are removed, then remove throttle control (41) from aircraft.

b. Cleaning. (1) Clean throttle control with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

(2) Clean clamps and brackets with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect throttle control for breaks and kinks.

(2) Inspect clamps, brackets, and retainers for cracks, elongated bolt holes, and distortion.

(3) Inspect grommets and ball-half for deterioration.

(4) Inspect bolts securing throttle control to throttle control lever and arm on carburetor for abnormal wear, crossed threads, and signs of shearing. Replace bolts if necessary.

(5) Inspect rod end bearings for evidence of wear and/or hole elongation. Replace rod ends if showing signs of wear.

NOTE

Enter inspections performed in steps (4) and (5) above on DA Forms 2407 and 2408-13, in accordance with TM 38-750.

d. Installation. (1) Route throttle control (41, figure 5-48) into position on aircraft.

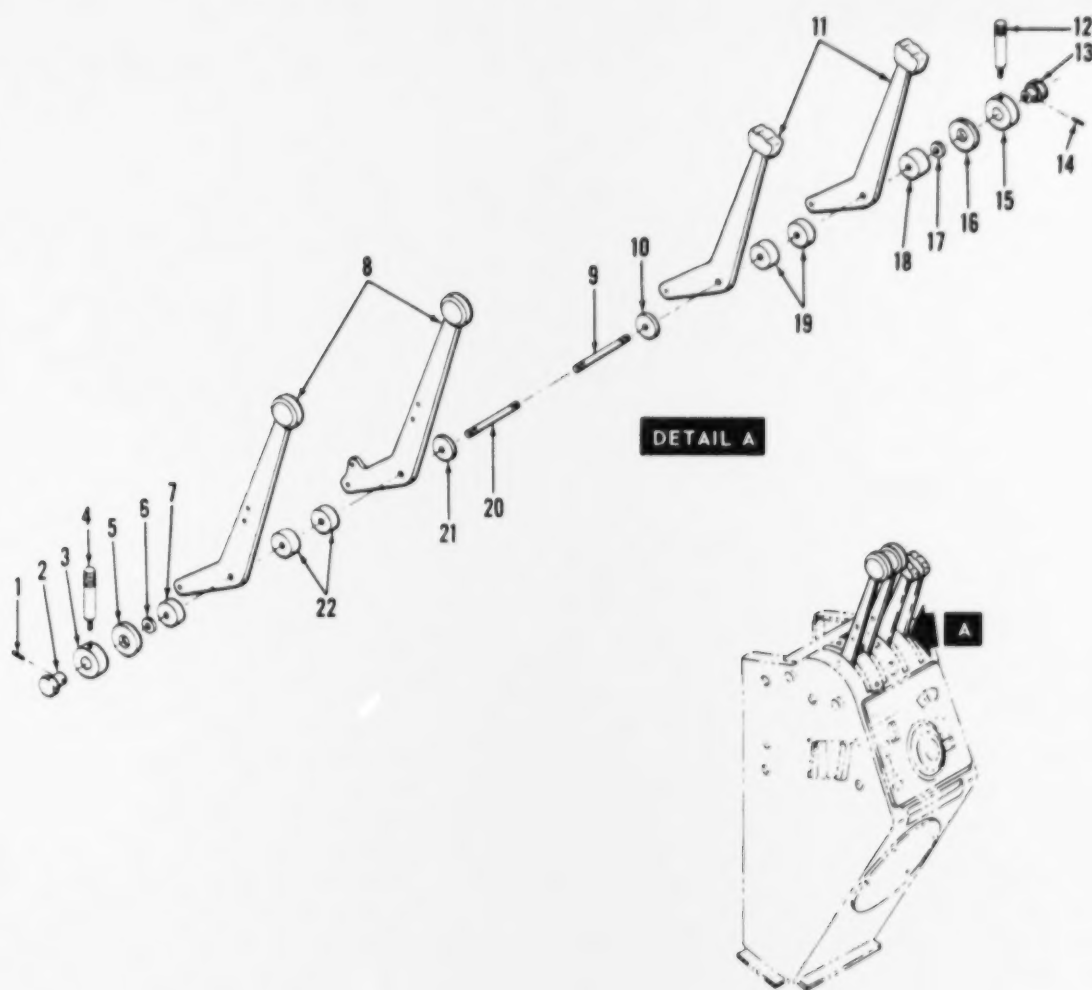
(2) Install rod ends (8 and 39) on ends of throttle control (41). Tighten locknuts (61 and 40).

(3) Position throttle control (41) on arm of engine control bracket and secure with bolt (36), washer (38), and nut (37). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

Inner race of rod end bearing should be tight against arm on engine control bracket to prevent shearing of bolt through vibration. Do not reuse nut (37).

- (4) Install throttle control (41) on bracket (42).
- (5) Install ball-half and grommet in retainer (44) and secure to firewall with screws (43), washers (45), and nuts (46).



- | | | | |
|-------------|------------------------------|--------------|-------------|
| 1. Pin | 7. Spacer | 13. Collar | 19. Spacers |
| 2. Collar | 8. Throttle control levers | 14. Pin | 20. Shaft |
| 3. Fitting | 9. Shaft | 15. Fitting | 21. Spacer |
| 4. Lever | 10. Spacer | 16. Felt pad | 22. Spacers |
| 5. Felt pad | 11. Propeller control levers | 17. Washer | |
| 6. Washer | 12. Lever | 18. Spacer | |

Figure 5-49. Throttle and propeller control levers (U-8F)

(6) Install block (23) and secure with bolts (21), washers (24), and nuts (25).

(7) Install clamps and grommets securing throttle control (41) to aircraft.

(8) Install clamp (59) and secure with screws (57), washers (58), and nuts (60).

(9) Install screws, bushings, washers, and nuts, securing warning horn cam in its mounting bracket.

(10) Connect throttle control (41) to throttle

control lever (2, figure 5-48) and secure with bolt (9, figure 5-47), washer (7), and nut (6). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

Inner race of rod end bearing should be tight against throttle control lever to prevent shearing of bolt through vibration. Do not reuse nut (6).



Figure 5-50. Power controls (U-8F) (sheet 1 of 2)

1. Locknut	13. Clamp	26. Nut	40. Screw	54. Cotter pin
2. Nut	14. Bolt	27. Washer	41. Nut	55. Cotter pin
3. Washer	15. Block	28. Clamp	42. Washer	56. Cotter pin
4. Rod end	16. Washer	29. Screw	43. Retainer	57. Cotter pin
5. Bolt	17. Nut	30. Washer	44. Screw	58. Nut
6. Nut	18. Oil shutoff valve control	31. Nut	45. Locknut	59. Washer
7. Washer	19. Bolt	32. Throttle control	46. Rod end	60. Bolt
8. Rod end	20. Washer	33. Screw	47. Washer	61. Cotter pin
9. Bolt	21. Nut	34. Retainer	48. Nut	62. Nut
10. Locknut	22. Rod end	35. Washer	49. Governor plate	63. Washer
11. Propeller control	23. Locknut	36. Nut	50. Bolt	64. Bolt
12. Alternate air air control	24. Screw	37. Clamp	51. Washer	
	25. Clamps	38. Washer	52. Screw	
		39. Nut	53. Cover	

Figure 5-50. Power controls (U-8F) (sheet 2 of 2)

(11) Install forward cabin floorboards and seats. (Refer to paragraphs 4-57 and 4-84, or 4-114 and 4-133.)

(12) Install center section wing leading edge. (Refer to paragraph 4-241.)

(13) Check throttle control for freedom of travel throughout its entire range.

(14) Adjust throttle control in accordance with step e.

(15) Close engine cowling doors.

e. Adjustment. (1) Open engine cowling doors.

(2) Disconnect throttle control (41, figure 5-47) from throttle control arm on carburetor.

(3) Move throttle control lever (2, figure 5-48) toward CLOSED position until throttle control lever is approximately 1/8-inch from end of its travel in control console, then tighten friction lock.

(4) Move throttle control arm on carburetor to CLOSED position.

(5) Adjust rod end to maintain positions previously set in steps (3) and (4) above.

(6) Connect throttle control (41, figure 5-47) to throttle control arm on carburetor.

(7) Loosen friction lock and check throttle control for freedom of travel throughout its range and for 1/8-inch springback at CLOSED position.

(8) Close engine cowling doors.

(9) Start engines in accordance with TM 55-1510-201-10.

(10) With propellers in low pitch (high rpm), check synchronization of throttle levers throughout their operating range.

(11) Adjust landing gear warning horn switch. (Refer to paragraph 12-49.)

(12) Stop engines in accordance with applicable operator's manual (-10).

5-196. PROPELLER CONTROL. (U-8D, U-8G, RU-8D)

5-197. A flexible propeller control (53, figure 5-47) connects to the propeller control lever (1, figure 5-48) and the arm on the propeller governor. A low pitch (high rpm) stop is incorporated on the propeller governor. At the propeller control lever, a cam and detent arrangement induces, by feel, the high pitch (low rpm) stop.

a. Removal. (1) Remove nut (2, figure 5-47), washer (3), and bolt (5) securing propeller control (53) to propeller control lever (1, figure 5-48).

(2) Remove screws securing detent cam block to propeller control lever.

(3) Remove forward cabin seats and floorboards. (Refer to paragraph 4-57 and 4-84, or 4-114 and 4-133.)

(4) Remove screws (57, figure 5-47), washers (58), nuts (60), and clamp (59).

(5) Remove center section wing leading edge. (Refer to paragraph 4-241.)

(6) Remove clamps and grommets securing propeller control (53) to aircraft.

NOTE

When removing clamps, mark propeller control on both sides of clamps to aid in relocation. If a new propeller control is installed, transfer these position marks to new propeller control.

(7) Open engine cowling doors.

(8) Remove nuts (25), washers (24), bolts (21), and block (23) securing propeller control (53).

(9) Remove nuts (20), washers (19), and screws (17) securing retainer (18) to firewall. Remove ball-half and grommet from retainer.

(10) Remove screws (55) and washers (56) securing cover (54) to governor plate (48).

(11) Remove nut (50), washer (49) and bolt (47) securing propeller control (53) to arm on propeller governor.

(12) Remove bolt securing clamp and propeller control (53) to governor plate (48).

(13) Loosen locknuts (1 and 52) and remove rod ends (4 and 51) from propeller control (53).

NOTE

When removing rod ends, count the number of turns required to remove rod ends. When installing rod ends on new propeller control, use the same number of turns.

(14) Ensure all clamps and grommets are removed, then remove propeller control (53) from aircraft.

b. Cleaning. (1) Clean propeller control with clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

(2) Clean clamp and brackets with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect propeller control for breaks and kinks.

(2) Inspect clamps, brackets, cover, and governor plate for cracks, elongated bolt holes, and distortion.

(3) Inspect grommets and ball-half for deterioration.

(4) Inspect bolts securing propeller control to propeller control lever and arm on governor for abnormal wear, crossed threads, and signs of shearing. Replace bolts if necessary.

(5) Inspect rod end bearings for evidence of wear and/or hole elongation. Replace rod ends if showing signs of wear.

NOTE

Enter inspections performed in steps (4) and (5) above on DA Forms 2407 and 2408-13, in accordance with TM 38-750.

d. Installation. (1) Route propeller control (53, figure 5-47) into position on aircraft.

(2) Install rod ends (4 and 51) on ends of propeller control (53). Tighten locknuts (1 and 52).

(3) Position propeller control (53) on arm of propeller governor and secure with bolt (47), washer (49), and nut (50). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

Inner race of rod end bearing should be tight against arm on propeller governor to prevent shearing of bolt through vibration. Do not reuse nut (50).

(4) Install bolt securing clamp and propeller control (53) to governor plate (48).

(5) Install cover (54) on governor plate (48) and secure with washers (56) and screws (55).

(6) Install ball-half and grommet in retainer (18) and secure to firewall with screws (17), washers (19) and nuts (20).

(7) Install block (23) and secure with bolts (21), washers (24), and nuts (25).

(8) Install clamps and grommets securing propeller control (53) to aircraft.

(9) Install clamp (59) and secure with screws (57), washers (58), and nuts (60).

(10) Connect propeller control (53) to propeller control lever (1, figure 5-48) and secure with bolt (5, figure 5-47), washer (3), and nut (2).

NOTE

Inner race of rod end bearing should be tight against propeller control lever to prevent shearing of bolt through vibration. Do not reuse nut (2).

(11) Install detent cam block on propeller control lever and secure with screws.

(12) Install center section wing leading edge. (Refer to paragraph 4-241.)

(13) Install forward cabin floorboards and seats. (Refer to paragraphs 4-57 and 4-84, or 4-114 and 4-133.)

(14) Adjust cam assembly as necessary to properly position propeller control lever (1, figure 5-48) in FEATHER position.

(15) Check propeller control for freedom of travel through its entire range.

(16) Close engine cowl doors.

5-198. MIXTURE CONTROL. (U-8D, U-8G, RU-8D)

5-199. A flexible mixture control (15, figure 5-47) connects to the mixture control lever (3, figure 5-48) and the carburetor mixture control arm on the carburetor. A positive stop is provided at the carburetor for IDLE CUT-OFF position.

a. Removal. (1) Remove nut (10, figure 5-47), washer (11), and bolt (13) securing mixture control (15) to mixture control lever (3, figure 5-48).

(2) Remove forward cabin seats and floorboard. (Refer to paragraph 4-57 and 4-84, or 4-114 and 4-133.)

(3) Remove screws (57, figure 5-47), washers (58), nuts (60), and clamp (59).

(4) Remove center section wing leading edge. (Refer to paragraph 4-241.)

(5) Open engine cowling doors.

(6) Remove clamps and grommets securing mixture control (15) to aircraft.

NOTE

When removing clamps, mark throttle control on both sides of clamp to aid in relocation. If a new throttle control is installed, transfer these position marks to new throttle control.

(7) Remove nuts (25), washers (24), bolts (21), and block (23).

(8) Remove nut (32), washer (31), and bolt (30) securing mixture control (15) to mixture control arm on carburetor.

(9) Remove mixture control (15) from bracket (35).

(10) Remove nuts (26), washers (27), and screws (29) securing retainer (28) to firewall. Remove ball-half and grommet from retainer.

(11) Loosen locknuts (14 and 34) and remove rod ends (12 and 33) from mixture control (15).

NOTE

When removing rod ends, count the number of turns required to remove rod ends. When installing rod ends on new mixture control, use the same number of turns.

(12) Ensure all clamps and grommets are removed, then remove mixture control (15) from aircraft.

b. Cleaning. (1) Clean mixture control with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

(2) Clean clamps and brackets with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect mixture control for breaks and kinks.

(2) Inspect clamps, brackets, and retainer for cracks, elongated bolt holes and distortion.

(3) Inspect grommet and ball-half for deterioration.

(4) Inspect bolts securing mixture control to mixture control arm on carburetor and to mixture control lever for abnormal wear, crossed threads, and signs of shearing. Replace bolts if necessary.

(5) Inspect rod end bearings for evidence of wear and/or hole elongation. Replace rod end if showing signs of wear.

NOTE

Enter inspections performed in steps (4) and (5) above on DA Forms 2407 and 2408-13 in accordance with TM 38-750.

d. Installation. (1) Route mixture control (15, figure 5-47) into position on aircraft.

(2) Install rod ends (12 and 33) on ends of mixture control (15). Tighten locknuts (14 and 34).

(3) Position mixture control (15) on mixture control arm of carburetor and secure with bolt (30), washer (31), and nut (32). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

Inner race of rod end bearing should be tight against mixture control a.m on carburetor to prevent shearing of bolt through vibration. Do not reuse nut (32).

(4) Install mixture control (15) on bracket (35).

(5) Install ball-half and grommet in retainer (28) and secure to firewall with screws (29), washers (27), and nuts (26).

(6) Install block (23) and secure with bolts (21), washers (24), and nuts (25).

(7) Install clamps and grommets securing mixture control (15) to aircraft.

(8) Install clamp (59) and secure with screws (57), washers (58), and nuts (60).

(9) Connect mixture control (15) to mixture control lever (3, figure 5-48) and secure with bolt (13, figure 5-47), washers (11) and nut (10). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

Inner race of rod end bearing should be tight against mixture control lever to prevent shearing of bolt through vibration. Do not reuse nut (10).

(10) Install forward cabin floorboards and seats. (Refer to paragraphs 4-57 and 4-84, or 4-114 and 4-133.)

(11) Install center section wing leading edge. (Refer to paragraph 4-241.)

(12) Check mixture control for freedom of travel through its entire range.

(13) Adjust mixture control in accordance with step e.

- (14) Close engine cowling doors.
- e. Adjustment. (1) Open engine cowling doors.
- (2) Disconnect mixture control (15, figure 5-47) from mixture control arm on carburetor.
- (3) Move mixture control lever (3, figure 5-48) toward FULL RICH position until it is 1/8-inch from end of its travel in control console, then tighten friction lock.
- (4) Move mixture control arm on carburetor to FULL RICH position.
- (5) Adjust rod end to maintain positions set in step (3) above.
- (6) Connect mixture control to mixture control arm on carburetor.
- (7) Loosen friction lock and move mixture control lever to IDLE CUT-OFF position.
- (8) Check mixture control arm on carburetor for complete travel from FULL RICH to IDLE CUT-OFF position.
- (9) Close engine cowling doors.
- (10) Start engine in accordance with TM 55-1510-201-10.
- (11) Operate engine at 1800 rpm, and move mixture control lever from FULL RICH to IDLE CUT-OFF position. Engine should operate without altering until mixture control lever reaches IDLE CUT-OFF position. If not, stop engine in accordance with TM 55-1510-201-10 and re-adjust mixture control as described in steps b through h above.

NOTE

Ensure mixture controls are synchronized in IDLE CUT-OFF and FULL RICH positions.

5-200. THROTTLE AND PROPELLER CONTROL LEVERS AND FRICTION LOCKS ASSEMBLY. (U-8F)

5-201. The throttle and propeller control levers and friction locks assembly consists of a set of levers (8 and 11, figure 5-49) mounted side by side on control shafts (9 and 20). Friction control locks are provided on the engine control to lock control levers in any desired position and to adjust forces required for control lever movement. The controls are locked by friction caused by spacers located between the control levers. Tightening the friction locks increases friction, and loosening the friction locks decreases friction.

a. Removal. (1) Working behind and under control console, remove nuts (2 and 6, figure 5-50), washers (3 and 7), and bolts (5 and 9) securing throttle and propeller controls (32 and 11) to

throttle and propeller control levers (8 and 11, figure 5-49).

(2) Remove cotter pin and pin securing cam actuator to throttle control lever (8).

(3) Remove pins (1 and 14) securing collars (2 and 13) and remove collars.

(4) Unscrew shafts (9 and 20) and pull out from throttle and propeller control levers (8 and 11).

NOTE

As shafts are pulled from console, spacers will fall free.

(5) Remove spacers (10, 19, 21 and 22).

(6) Remove fittings (3 and 15), levers (4 and 12), felt pads (5 and 16), washers (6 and 17), and spacers (7 and 18).

(7) Remove throttle and propeller control levers (8 and 11) from control console.

b. Cleaning. (1) Clean all metal parts of control levers and friction locks assembly with dry cleaning solvent (item 6, table 1-8).

(2) Wipe parts dry with a clean dry cloth.

c. Inspection. (1) Inspect control levers for cracks, wear, and hole elongation. Replace if showing signs of wear.

(2) Inspect shafts for wear and malformed threads.

(3) Inspect spacers, collars, and fittings for wear, cracks and distortion.

d. Repair. Repair consists of replacing damaged or worn parts. Ensure all parts are clean and free of lubricant.

e. Installation. (1) Position throttle and propeller control levers (8 and 11, figure 5-49) in control console.

(2) Install shafts (9 and 20) through throttle and propeller control levers (8 and 11).

(3) Install spacers (10, 19, 21, and 22) one on each side of throttle and propeller control levers (8 and 11) as shafts (9 and 20) are installed.

(4) Install fittings (3 and 15), levers (4 and 12), felt pads (5 and 16), washers (6 and 17), and spacers (7 and 18).

(5) Install collars (2 and 13) and secure with pins (1 and 14).

(6) Install cam actuator on throttle control lever (8) and secure with cotter pin.

(7) Connect throttle and propeller controls (32 and 11, figure 5-50) to throttle and propeller control levers (8 and 11, figure 5-49). Secure with bolts (5 and 9, figure 5-50), washers (3 and 7), and nuts (2 and 6). Tighten nuts to a torque of 20 to 30 inch-pounds.

NOTE

Ensure inner race of rod end bearings are tight against control levers to prevent shearing of bolts through vibration. Do not reuse nuts (2 and 6).

(8) Check throttle and propeller controls for freedom of travel throughout their entire operating range.

5-202. THROTTLE CONTROL. (U-8F)

5-203. The throttle lever actuates the throttle control (32, figure 5-50) which is connected to the arm on the crossover shaft and to the throttle valve control arm through linkage mounted on the supercharger air inlet housing. A landing gear warning horn switch is actuated by throttle control lever to sound the warning horn if either or both throttles are retarded below 14 inches manifold pressure with landing gear retracted.

a. Removal. (1) Remove pilot's and copilot's seats. (Refer to paragraph 4-159.)

(2) Remove cabin compartment seats and floor webs. (Refer to paragraphs 4-191 and 4-208.)

(3) Remove tape from throttle control (32, figure 5-50), just aft of control console.

(4) Remove center section wing leading edge. (Refer to paragraph 4-241.)

(5) Remove nut (2), washer (3), and bolt (5) securing throttle control (32) to throttle control lever (8, figure 5-49).

(6) Remove clamp (13, figure 5-50) securing controls to aircraft.

NOTE

When removing throttle control from clamp, mark throttle control on both sides of clamp to aid in relocation. If a new throttle control is installed, transfer these position marks to new throttle control.

(7) Remove nut (17), washer (16), and bolt (14) securing controls in block (15). Remove throttle control (32) from block (15).

(8) Open engine cowl doors.

(9) Remove nuts (36), washers (35), and screws (33) securing retainer (34) to firewall. Remove ball-half and grommet from retainer.

(10) Remove nuts (31), washers (30), and screws (29) securing clamps (25 and 28) to firewall.

(11) Remove nut (26), washer (27), and screw (24) securing clamps (25 and 28) to throttle control (32).

(12) Remove nut (21), washer (20), and bolt (19) securing throttle control (32) to arm on crossover shaft.

(13) Remove rod ends (4 and 22) from throttle control (32).

(14) Ensure clamps and grommets are removed then remove throttle control (32) from aircraft.

b. Cleaning. (1) Clean throttle control with a clean cloth moistened in dry cleaning solvent (item 6, table 1-8).

(2) Clean clamps and brackets with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect clamps and brackets for cracks, elongated bolt holes, and distortion.

(2) Inspect throttle control cable for breaks and kinks.

(3) Inspect bolts securing throttle control to throttle control lever and arm on crossover shaft for abnormal wear, crossed threads, and signs of shearing. Replace bolts, if necessary.

(4) Inspect rod end bearings for evidence of wear and/or hole elongation. Replace if showing signs of wear.

NOTE

Enter inspections performed in steps (3) and (4) above on DA Forms 2407 and 2408-13, in accordance with TM 38-750.

d. Installation. (1) Route throttle control (32, figure 5-50) into position on aircraft.

(2) Install rod ends (4 and 22) on ends of throttle control (32). Tighten locknuts (1 and 23).

(3) Connect throttle control (32) to arm on crossover shaft and secure with bolt (19), washer (20), and nut (21). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

Ensure inner race of rod end bearing is tight against arm on crossover shaft to prevent shearing of bolt through vibration. Do not reuse nut (21).

(4) Install clamps (25 and 28) on throttle control (32) and secure with screw (24), washer (27), and nut (26).

(5) Install clamps (25 and 28) on firewall and secure with screws (29), washers (30), and nuts (31).

(6) Install ball-half and grommet in retainer (34) and secure retainer to firewall with screws (33), washers (35), and nuts (36).

(7) Install throttle control (32) in block (15) and secure with bolt (14), washer (16), and nut (17).

(8) Install clamp (13) securing controls to aircraft.

(9) Connect throttle control (32) to throttle control lever (8, figure 5-49) and secure with bolt (5, figure 5-50), washer (3), and nut (2). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

Ensure inner race of rod end bearing is tight against throttle control lever to prevent shearing of bolt through vibration. Do not reuse nut (2).

(10) Wrap throttle control (32) with tape (item 53, table 1-8) just aft of control console.

(11) Install center section wing leading edge. (Refer to paragraph 4-241.)

(12) Install cabin compartment floorboards and seats. (Refer to paragraphs 4-191 and 4-208.)

(13) Install pilot's and copilot's seats. (Refer to paragraph 4-159.)

(14) Adjust throttle control in accordance with step e.

(15) Close engine cowling doors.

e. Adjustment. (1) Open engine cowling doors. (2) Remove nut (21, figure 5-50), washer (20), and bolt (19) securing throttle control to arm on crossover shaft.

(3) Move throttle control lever (8, figure 5-49) toward CLOSED position until lever is approximately 1/8-inch from CLOSED position, then tighten friction lock.

(4) Move throttle lever arm on supercharger air inlet housing to CLOSED position.

(5) Loosen locknut (23, figure 5-50) and adjust rod end (22) to maintain positions in steps (3) and (4) above. Tighten locknut.

(6) Connect throttle control (32) to arm on crossover shaft and secure with bolt (19), washer (20), and nut (21). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

Ensure inner race of rod end bearing is tight against arm on crossover shaft to prevent shearing of bolt through vibration. Do not reuse nut (21).

(7) Loosen friction lock.

(8) Check throttle control for freedom of travel throughout its entire range and for 1/8-inch springback at CLOSED position.

(9) Close engine cowling doors.

(10) Start engines in accordance with TM 55-1510-201-10.

(11) With propeller in low pitch (high rpm), check synchronization of throttle control lever throughout operating range.

(12) Adjust landing gear warning horn switch. (Refer to paragraph 12-75.)

(13) Stop engines in accordance with TM 55-1510-201-10.

5-204. PROPELLER CONTROL. (U-8F)

5-205. The propeller control (11, figure 5-50) connects to the propeller control lever (11, figure 5-49) and the propeller governor arm. A low pitch (high rpm) stop is incorporated on the governor. A cam and detent, connected to the propeller control lever, induces, by feel, the high pitch (low rpm) stop.

a. Removal. (1) Remove pilot's and copilot's seats. (Refer to paragraph 4-159.)

(2) Remove flight compartment floor webs. (Refer to paragraph 4-177.)

(3) Remove nut (6, figure 5-50), washer (7), and bolt (9) securing propeller control (11) to propeller control lever (11, figure 5-49).

(4) Remove tape from propeller control (11, figure 5-50) just aft of control console.

(5) Remove center section wing leading edge. (Refer to paragraph 4-241.)

(6) Remove clamp (13) securing controls to aircraft.

NOTE

When removing clamp, mark propeller control on both sides of clamp to aid in relocation. If a new propeller control is to be installed, transfer these position marks to new propeller control.

(7) Remove nut (17), washer (16), and bolt (14) securing block (15) to aircraft. Remove propeller control (11) from block.

(8) Open engine cowling doors.

(9) Remove nuts (41), washers (42), and screws (44) securing retainer (43) to firewall. Remove ball-half and grommet from retainer.

(10) Remove nut (39), washer (38), and screw (40) securing clamp (37) to propeller control (11).

(11) Remove screws (52) and washers (51) securing cover (53) to governor plate (49). Remove cover.

(12) Remove nut (48), washer (47), and bolt (50) securing propeller control (11) to arm on governor.

(13) Remove bolt securing clamp and propeller control (11) to bracket on governor plate (49).

(14) Remove rod ends (8 and 46) from propeller control (11).

(15) Ensure all clamps and grommets are removed, then remove propeller control (11) from aircraft.

b. Cleaning. (1) Clean propeller control with a clean cloth moistened with dry cleaning solvent (item 6, table 1-8).

(2) Clean clamps, brackets, and cover with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect clamps, brackets, cover and governor plate for cracks, elongated bolt holes, and distortion.

(2) Inspect propeller control cable for breaks and kinks.

(3) Inspect bolts securing propeller control to propeller control lever and arm on governor for abnormal wear, crossed threads, and signs of shearing. Replace bolts if necessary.

(4) Inspect rod end bearings for evidence of wear and/or hole elongation. Replace if showing signs of wear.

NOTE

Enter inspections performed in steps (3) and (4) above on DA Forms 2407 and 2408-13, in accordance with TM 38-750.

d. Installation. (1) Route propeller control (11, figure 5-50) into position on aircraft.

(2) Install rod ends (8 and 46) on propeller control (11) and tighten locknuts (10 and 45).

(3) Install bolt securing clamp and propeller control (11) to bracket on governor plate (49).

(4) Connect propeller control (11) to arm on governor and secure with bolt (50), washer (47), and nut (48). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

Ensure inner race of rod end bearing is tight against arm on governor to prevent shearing of bolt through vibration. Do not reuse nut (48).

(5) Install cover (53) on governor plate (49) and secure with screws (52) and washers (51).

(6) Install clamp (37) on propeller control (11) and secure with screw (40), washer (38), and nut (39).

(7) Install ball-half and grommet in retainer (43) and secure retainer to firewall with screws (44), washers (42), and nuts (41).

(8) Install propeller control (11) in block (15) and secure with bolt (14), washer (16), and nut (17).

(9) Install clamp (13) securing control to aircraft.

(10) Connect propeller control (11) to propeller control lever (11, figure 5-49) and secure with bolt (9, figure 5-50), washer (7), and nut (6). Tighten nut to a torque of 20 to 30 inch-pounds.

NOTE

Ensure inner race of rod end bearing is tight against propeller control lever to prevent shearing of bolt through vibration. Do not reuse nut (6).

(11) Wrap propeller control (11) with tape (item 53, table 1-8) just aft of control console.

(12) Install flight compartment floor webs. (Refer to paragraph 4-177.)

(13) Install pilot's and copilot's seats. (Refer to paragraph 4-159.)

(14) Install center section wing leading edge. (Refer to paragraph 4-241.)

(15) Close engine cowling doors.

CHAPTER 6

HYDRAULIC AND PNEUMATIC SYSTEMS

SECTION I SCOPE

6-1. PURPOSE.

6-2. The purpose of this chapter is to provide the essential information for maintenance personnel to accomplish organizational maintenance on the complete hydraulic and pneumatic system in accordance with the Maintenance Allocation Chart. (Refer to Appendix B.)

6-3. DESCRIPTION.

6-4. The hydraulic and pneumatic system for the U-8 aircraft consists only of the brake hydraulic system. The pneumatic system is not applicable to the U-8 aircraft.

SECTION II HYDRAULIC SYSTEM

6-5. DESCRIPTION.

6-6. The U-8 aircraft has only the brake hydraulic system. See figure 6-1 for schematic diagram of the brake hydraulic system.

6-7. BRAKE HYDRAULIC SYSTEM.

6-8. The brake hydraulic system for all U-8 aircraft is the same basic system, except for

location of some hydraulic components and routing of the hydraulic lines. The brake hydraulic system consists of a hydraulic reservoir (4, figure 6-2), brake cylinders (1 and 3), shuttle valves (5 and 6) parking brake control (2), parking brake valves (7), and hydraulic lines, fittings, and clamps.

a. Troubleshooting. For troubleshooting procedures for the brake hydraulic system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Solid pedal and no brake	Brake linings worn beyond allowable limits	Replace brake linings. (Refer to paragraph 4-261.)
Spongy brakes	Air in brake hydraulic system	Bleed brake hydraulic system. (Refer to paragraph 6-7.)
	Low hydraulic fluid level	Service hydraulic reservoir. (Refer to paragraph 1-138.)
Unable to hold pressure	Leak in brake hydraulic system	Tighten connection or replace hydraulic line. (Refer to paragraph 6-19.)
	Brake cylinder seal leaking	Replace brake cylinder. (Refer to paragraph 6-11.)
Pedals bottom, no brakes	Broken or leaking hydraulic lines	Replace hydraulic lines. (Refer to paragraph 6-19.)
	Brake cylinder seal failure	Replace brake cylinder. (Refer to paragraph 6-11.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Parking brake will not hold	Air in brake hydraulic system	Bleed brake hydraulic system. (Refer to paragraph 6-17.)
	Defective parking brake valve	Replace parking brake valve. (Refer to paragraph 6-17.)
	Parking brake control out of adjustment	Adjust parking brake control. (Refer to paragraph 6-15.)
Brakes grab	Stones or foreign matter locking brake disc	Remove stones or foreign matter.
	Warped or bent disc	Replace disc. (Refer to paragraph 4-255.)
Brakes drag	Packing nut or threaded bushing, as applicable, too loose	Tighten packing nut or threaded bushing. (Refer to note below.)
Brakes weak	Packing nut or threaded bushing, as applicable, too tight	Loosen packing nut or threaded bushing and retighten. (Refer to note below.)
NOTE On cylinder head, part No. 9510928, tighten packing nut to a torque of 15 foot-pounds. On cylinder head, part No. 9524829, screw threaded bushing tightly into cylinder head, then back off one-eighth turn. Secure threads bushing with locknut.		

b. Operational Check. (1) Service hydraulic reservoir in accordance with paragraph 1-138.

(2) Apply pressure to top of each rudder pedal to actuate each brake cylinder and check for proper operation. While pressure is applied to each rudder pedal, check brake cylinder for leakage.

(3) Apply pressure to top of pilot's rudder pedals, and then copilot's rudder pedals, to actuate shuttle valves. Ensure that brake assembly at each main wheel operates each time the rudder pedals are actuated. Check shuttle valves for leakage.

(4) Apply pressure to top of pilot's rudder pedals and pull handle of parking brake control fully out, actuating parking brake valves. If brakes hold, parking brake valves are operating properly.

(5) While handle of parking brake control is fully out, check brake hydraulic system components for leakage.

(6) Apply pressure to top of pilot's rudder pedals and push handle of parking brake control fully in. Ensure that parking brake valves are fully off and brakes are released.

(7) For troubleshooting brake hydraulic system, refer to step a.

c. Bleeding. (1) Ensure that handle of parking brake control is pushed fully in.

(2) Disconnect tube assembly (2, figure 6-3) from hydraulic reservoir (1) and allow hydraulic fluid to drain from hydraulic reservoir into a suitable container.

(3) Connect flexible hose (6) to tube assembly (2) and place other end of flexible hose in container (5) containing enough hydraulic fluid (item 3, table 1-8) to cover end of flexible hose.

NOTE

Ensure that hydraulic fluid always covers end of flexible hose (6).

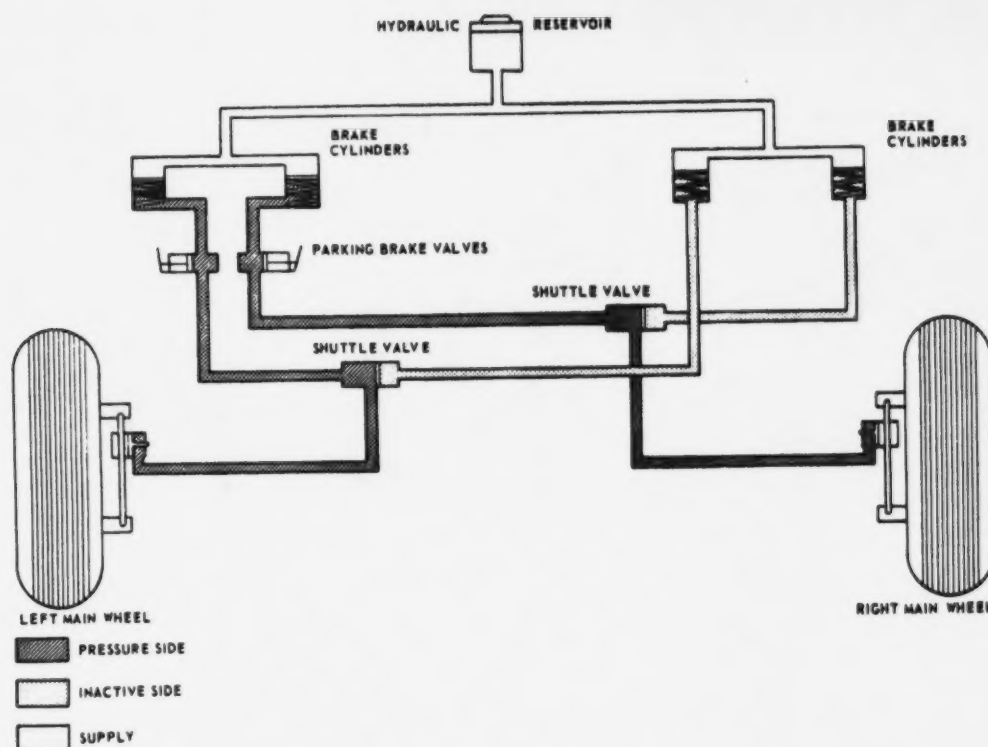


Figure 6-1. Brake hydraulic system schematic diagram

(4) Remove screw and washer from bleeder valve (3) and connect hose from pressure bleeder tank (4) to bleeder valve.

NOTE

Ensure that pressure bleeder tank (4) is full of hydraulic fluid (item 3, table 1-8) and maintain approximately 30 psi of air pressure.

(5) Apply pressure to copilot's rudder pedals to actuate shuttle valves (5 and 6, figure 6-2) to route hydraulic fluid through copilot's side of brake hydraulic system.

(6) Open bleeder valve (3, figure 6-3) and bleed brake hydraulic system until hydraulic fluid coming out of flexible hose (6) is free of air bubbles.

(7) Apply pressure to pilot's rudder pedals to actuate shuttle valves (5 and 6, figure 6-2) to route hydraulic fluid through pilot's side of

brake hydraulic system. Allow to bleed until hydraulic fluid coming out of flexible hose (6, figure 6-3) is free of air bubbles.

(8) Close bleeder valve (3) and disconnect hose of pressure bleeder tank (4) from bleeder valve. Install screw and washer in bleeder valve.

(9) Move pressure bleeder tank (4) to other brake assembly and repeat steps (4) through (8) to bleed other side of brake hydraulic system.

(10) Disconnect flexible hose (6) from tube assembly (2). Connect tube assembly to hydraulic reservoir (1).

(11) Service hydraulic reservoir (1) in accordance with paragraph 1-138.

(12) Perform operational check in accordance with step b.

6-9. HYDRAULIC RESERVOIR.

6-10. The hydraulic reservoir (4, figure 6-2) for the U-8D, U-8G and RU-8D aircraft is located on the right side, forward of the rear bulkhead

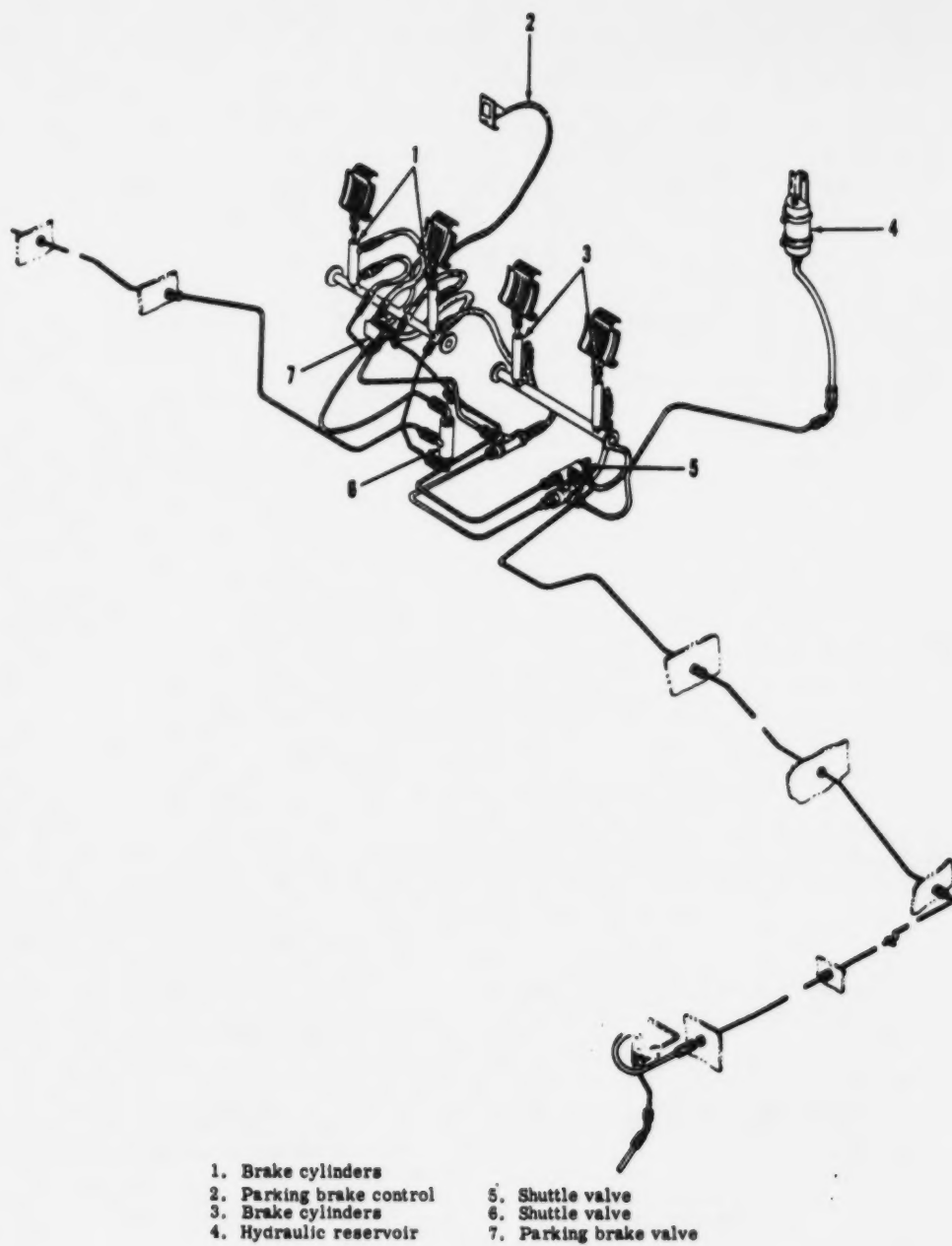


Figure 6-2. Brake hydraulic system (U-8D, U-8G, and RU-8D) (sheet 1 of 2)

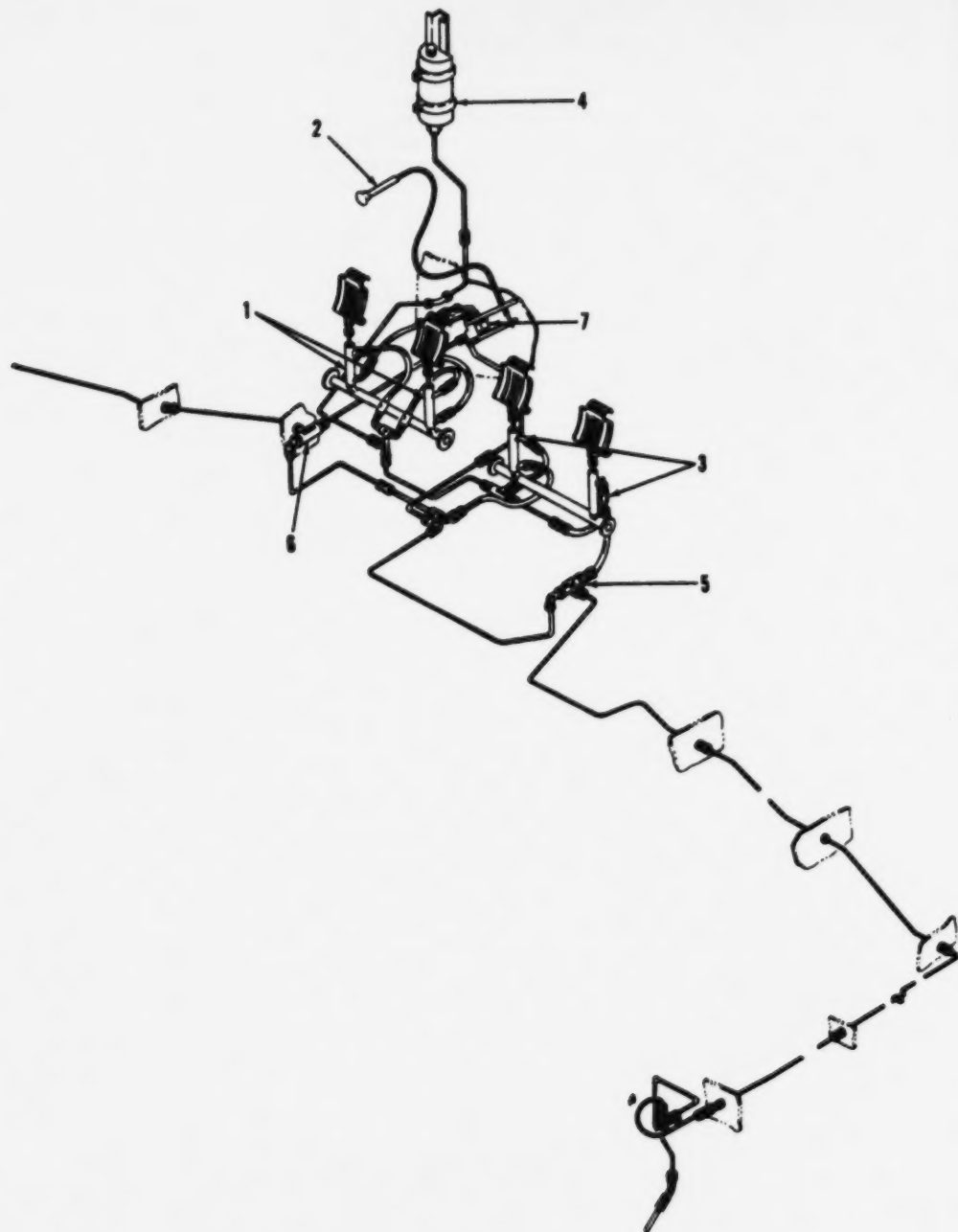


Figure 6-2. Brake hydraulic system (U-8F) (sheet 2 of 2)

at F.S. 73.00 in the nose equipment compartment. On the U-8F aircraft, it is located on left side, forward of the rear bulkhead at F.S. 84.00, in the nose equipment compartment. The purpose of the hydraulic reservoir is to hold a reserve of hydraulic fluid to replace any hydraulic fluid that is lost through leakage.

a. Removal. (1) Open door of nose baggage compartment to gain access to hydraulic reservoir (4, figure 6-2).

(2) Apply pressure to top of pilot's rudder pedals and push handle of parking brake control fully in.

(3) Remove screw and washer from bleeder valve (3, figure 6-3). Open bleeder valve and drain hydraulic fluid from brake hydraulic system until hydraulic reservoir (4, figure 6-2) is empty (approximately 1 pint). Close bleeder valve and install washer and screw.

(4) Disconnect tube assembly (2, figure 6-3) from hydraulic reservoir (4, figure 6-2) and install a cap on tube assembly.

(5) Remove screws, washers, and nuts and remove hydraulic reservoir (4) from bracket.

b. Cleaning. Clean hydraulic reservoir with dry cleaning solvent (item 6, table 1-8) and dry with filtered compressed air.

c. Inspection. Inspect hydraulic reservoir for cracks and dents.

d. Installation. (1) Position hydraulic reservoir (4, figure 6-2) on bracket in nose baggage compartment and secure with screws, washers, and nuts.

(2) Remove cap from tube assembly to hydraulic reservoir (4, figure 6-2).

(3) Service hydraulic reservoir (4) in accordance with paragraph 1-138.

(4) Perform operational check in accordance

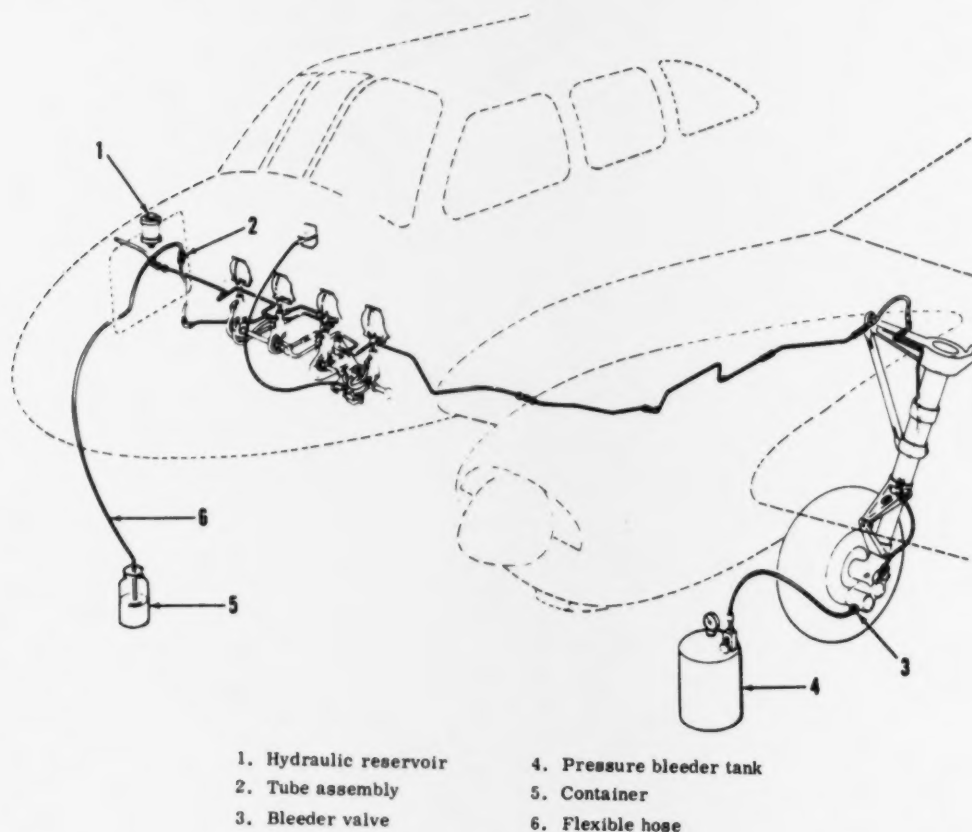


Figure 6-3. Bleeding brake hydraulic system

with paragraph 6-8. If brakes are soft or spongy, bleed system in accordance with paragraph 6-8.

6-11. BRAKE CYLINDERS.

6-12. There are four brake cylinders (1 and 3, figure 6-2) installed on U-8 aircraft. The brake cylinders are connected to the rudder pedals and the support tubes below the floorboard. The brake cylinders are the compensating barrel type, maintaining a constant and correct volume of hydraulic fluid in the brake hydraulic system. The brake cylinders are actuated by applying pressure to the top of the rudder pedals.

a. Removal. (1) Remove carpet and floorboard (or floor web), as necessary, around rudder pedals to gain access to lower ends of brake cylinders (1 and 3, figure 6-2). (See Chapter 4, Section II.)

(2) Disconnect hose assembly from each brake assembly at each main wheel and drain brake hydraulic system. Reconnect hose assemblies.

(3) Disconnect hose assemblies from brake cylinders (1 and 3). Cap ends of hose assemblies.

(4) Remove cotter pin, washer, and pin securing upper end of each brake cylinder (1 and 3) to rudder pedal and cotter pin, washer, and pin securing lower end of each brake cylinder to support tube. Remove brake cylinders.

(5) Remove fittings from brake cylinders (1 and 3) and cap open ports.

b. Cleaning. Clean brake cylinders with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect brake cylinder for cracks and dents.

(2) Inspect fittings for distorted or stripped threads.

(3) Inspect rod for approximately seven threads exposed.

d. Installation. (1) Remove caps and install fittings in brake cylinders (1 and 3, figure 6-2).

(2) Position brake cylinders (1 and 3) on rudder pedals and support tubes and install pins, washers, and cotter pins.

(3) Adjust clevis on rod (if required) so that approximately seven threads on rod are exposed after nut is tightened.

(4) Remove caps from hose assemblies and connect hose assemblies to brake cylinders (1 and 3).

(5) Bleed brake hydraulic system in accordance with paragraph 6-8.

(6) Perform operational check in accordance with paragraph 6-8.

(7) Install floorboard (or floor web) and carpet. (See Chapter 4, Section II.)

6-13. SHUTTLE VALVES.

6-14. The shuttle valves (5 and 6, figure 6-2) are located under the floorboard, just forward of the pilot's and copilot's seats. The function of the shuttle valves is to transfer brake operation from one side to the other, depending on whether the pilot or copilot applies the greater pressure.

a. Removal. (1) Remove carpet and floorboard (or floor web), as necessary, to gain access to shuttle valves (5 and 6, figure 6-2). (See Chapter 4, Section II.)

(2) Disconnect hose assembly from each brake assembly at each main wheel and drain brake hydraulic system. Reconnect hose assemblies.

(3) Disconnect tube assemblies from shuttle valves (5 and 6) and cap end of each tube assembly. Remove shuttle valves and cap fittings on shuttle valves.

b. Cleaning. Clean shuttle valves with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect shuttle valves for cracks, dents, and distorted or stripped threads.

d. Installation. (1) Remove caps from ends of tube assemblies and fitting of shuttle valves (5 and 6, figure 6-2).

(2) Position shuttle valves (5 and 6) on ends of tube assemblies and connect tube assemblies.

(3) Bleed brake hydraulic system in accordance with paragraph 6-8.

(4) Perform operational check in accordance with paragraph 6-8.

(5) Install floorboard (or floor web) and carpet. (See Chapter 4, Section II.)

6-15. PARKING BRAKE CONTROL.

6-16. The parking brake control (2, figure 6-2) on the U-8F aircraft is the push-pull type and incorporates an automatic lock. The handle for the parking control on the U-8F aircraft is located at the end of the left subpanel. The parking brake control for the U-8D, U-8G, and RU-8D aircraft is also the push-pull type, but does not have an automatic lock. The handle for the U-8D, U-8G, and RU-8D aircraft is located in the center of the left subpanel. The lower end of the parking brake control on all U-8 aircraft is connected to the retainer of the parking brake valves (7).

a. Removal. (1) Remove carpet and floorboard (or floor web), as necessary, to gain access to parking brake valves (7, figure 6-2). (See Chapter 4, Section II.)

(2) Loosen screw securing control wire in retainer between arms of parking brake valves (7).

(3) Loosen screws on block assembly securing lower end of parking brake control (2) in position on fuselage structure.

(4) Remove screw securing handle to control wire at subpanel and remove handle.

(5) Remove placard from subpanel on U-8F aircraft only.

(6) Remove nut securing upper end of conduit and control wire in subpanel.

(7) Pull conduit and control wire as an assembly from subpanel and block assemblies below floorboard.

b. Cleaning. Clean parking brake control in dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect conduit and control wire for bends, dents, and corrosion.

(2) Inspect handle of parking brake control for bends and cracks.

d. Installation. (1) Position conduit and control wire in subpanel and block assembly below floorboard.

(2) Install nut securing conduit and control wire in subpanel.

(3) Position lower end of control wire in retainer between arms of parking brake valves (7, figure 6-2) and tighten screw.

(4) Tighten screws securing conduit and control wire in block assemblies.

(5) Install placard on subpanel for U-8F aircraft only.

(6) Position handle on control wire at subpanel and secure with screw.

(7) Operate parking brake control (2) by applying pressure to pilot's rudder pedals and pulling out on handle. Ensure that parking brake valves (7) are fully on.

(8) Apply pressure to pilot's rudder pedals and push handle of parking brake control (2) fully in. Ensure that brakes are off.

e. Adjustment. (1) Loosen screw securing control wire of parking brake control (2, figure 6-2) in retainer between arms of parking brake valves (7).

(2) Loosen screws securing lower end of conduit of parking brake control (2) in block assembly below floorboard.

(3) Push handle of parking brake control fully in and tighten screw securing control wire in retainer between arms of parking brake valves (7).

(4) Position lower end of conduit in block assembly and tighten screws.

(5) Install floorboard (or floor web) and carpet. (See Chapter 4, Section II.)

6-17. PARKING BRAKE VALVES.

6-18. The parking brake valves (7, figure 6-2) are located on a bracket below the floorboard. Both parking brake valves are mounted together. The parking brake valves are operated by applying pressure to the top of the pilot's rudder pedals and pulling out on the handle of the parking brake control (2). To release the parking brake valves, apply pressure to top of the pilot's rudder pedals and push the handle of the parking brake control fully in.

a. Removal. (1) Remove carpet and floorboard (or floor web), as necessary, to gain access to parking brake valves (7, figure 6-2) below floorboard. (See Chapter 4, Section II.)

(2) Disconnect hose assembly from each brake assembly at each main wheel and drain brake hydraulic system. Reconnect hose assemblies.

(3) Disconnect hydraulic lines from parking brake valves (7) and cap ends of hydraulic lines.

(4) Loosen screw and remove control wire of parking brake control (2) from retainer between arms of parking brake valves (7).

(5) Remove bolts, washers, and nuts and remove parking brake valves (7) from bracket.

(6) Install dust plugs in open ports of parking brake valves (7).

b. Cleaning. Clean parking brake valves with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect body of each parking brake valve for cracks and dents.

(2) Inspect arms of parking brake valves for bends, cracks, and security of attachment.

d. Installation. (1) Remove dust plugs from open ports and position parking brake valves (7, figure 6-2) on bracket; secure with bolts, washers, and nuts.

(2) Remove caps from hydraulic lines and connect hydraulic lines to parking brake valves (7).

(3) Position end of control wire of parking brake control (2) in retainer between arms of parking brake valves (7) and tighten screw.

(4) Bleed brake hydraulic system in accordance with paragraph 6-8.

(5) Perform operational check in accordance with paragraph 6-8.

(6) Install floorboard (or floor web) and carpet. (See Chapter 4, Section II.)

6-19. HYDRAULIC LINES, FITTINGS, AND CLAMPS.

6-20. There are two types of hydraulic lines used in the brake hydraulic system; rigid aluminum alloy tube assemblies and flexible hose

assemblies. For the location of the tube and hose assemblies, see figure 6-2. The hydraulic lines use conventional fittings and clamps and can be removed or installed easily with common tools.

a. Removal. (1) Remove carpet, floorboard, and access panels, as necessary, to gain access to hydraulic lines, fittings, and clamps. (See Chapter 4, Section II.)

(2) Disconnect hose assembly from each brake assembly at each main wheel and drain brake hydraulic system. Reconnect hose assemblies, if not being removed.

(3) Remove attaching hardware and remove clamps from tube or hose assemblies to be removed.

(4) Disconnect tube or hose assemblies from other tube or hose assemblies or hydraulic components and remove tube or hose assemblies.

(5) Cap open ends of tube or hose assemblies and all open ports of hydraulic components left installed to keep foreign matter out of brake hydraulic system.

(6) Remove fittings (elbows or nipples) installed in fuselage structure by first noting position of fittings. Remove nuts and washers

and remove fittings from fuselage structure.

b. Inspection. (1) Inspect tube assemblies for cracks, dents, and nicks.

(2) Inspect hose assemblies for fraying and deterioration and end fittings for stripped threads.

(3) Inspect fittings (elbows or nipples) for distorted and stripped threads.

c. Installation. (1) Position fittings (elbows or nipples) in fuselage structure as noted at time of removal and secure with washers and nuts.

(2) Remove caps from ends of tube or hose assemblies and ports of hydraulic components. Blow tube or hose assemblies clear with filtered, compressed air.

(3) Place tube or hose assemblies in proper position and connect to other tube or hose assemblies or hydraulic components.

(4) Position clamps on tube or hose assemblies and secure with attaching hardware.

(5) Bleed brake hydraulic system in accordance with paragraph 6-8.

(6) Perform operational check in accordance with paragraph 6-8.

(7) Install access panels, floorboard (or floor web) and carpet. (See Chapter 4, Section II.)

SECTION III PNEUMATIC SYSTEM

Not Applicable

CHAPTER 7
POWER TRAIN SYSTEMS

Not Applicable

CHAPTER 8 PROPELLERS

SECTION I SCOPE

8-1. PURPOSE.

8-2. The purpose of this chapter is to provide all the information for maintaining personnel to accomplish organizational maintenance on the complete propeller system.

8-3. DESCRIPTION.

8-4. A Hartzell, three-bladed aluminum propeller is used on the U-8 aircraft. The propeller is spline mounted and has a blade diameter of 93 inches. A hydraulic cylinder, linked to the clamp and counterweight subassembly provides

desired pitch changes in response to internal oil pressure. Control of the oil supply controls pitch of the propeller. Increased oil pressure reduces blade pitch; the absence of oil pressure permits the centrifugal force of counterweights to increase blade pitch. Counterweights and a feathering spring subassembly provide for necessary feathering action of blades. Centrifugally-actuated stops prevent feathering spring subassembly from feathering the propeller while engine is stopped. These stops spring out mechanically when the propeller slows to approximately 850 rpm. Over 850 rpm the stops disengage by centrifugal force. The actuating oil pressure is supplied by a governor mounted on the engine.

SECTION II PROPELLERS

8-5. PROPELLER.

8-6. The propeller is a three-bladed controllable pitch full feathering, constant speed unit. It consists primarily of a hub spider, three blades, and an anti-icing ring assembly. The entire propeller mechanism is surrounded by a spinner assembly which consists of a dome and a rear

bulkhead. To the rear bulkhead are attached the centrifugal high pitch stops and a slinger ring for anti-icing fluid. The spinner dome contains tubes which distribute the anti-icing fluid to the propeller blades. A propeller governor provides the necessary oil pressure to actuate the propeller mechanism. For troubleshooting procedures for the propeller, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Failure of pitch to change	Propeller governor improperly adjusted	Readjust governor. (Refer to paragraph 8-13.)
	Governor control linkage improperly set	Check for freedom of movement.
Propeller surging	Governor pressure too low	Readjust governor. (Refer to paragraph 8-13.)
	Air trapped in propeller actuating piston or engine shaft	Exercise propeller by changing pitch several times.
	Governor lacks sufficient dampening	Replace governor. (Refer to paragraph 8-13.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Improper rpm	Static rpm to low	Open throttle and move governor control back and forth slowly to determine if propeller or governor stop is limiting maximum rpm. Notify direct support maintenance unit if propeller stop is causing low static rpm. Adjust governor if found to be at fault. (Refer to paragraph 8-13.)
	Static rpm too high	Adjust governor. (Refer to paragraph 8-13.)
Propeller will not feather	High pitch stop fails to slide out at feathering rpm	Notify direct support maintenance unit.
	Weak or broken feathering spring	Notify direct support maintenance unit.

8-7. PROPELLER SPINNER ASSEMBLY.

8-8. The propeller spinner assembly (figure 8-1) encloses the propeller hub and pitch changing mechanism. It contains the fluid delivery tube assembly and is secured to spinner bulkhead assembly with screws.

a. Removal. (1) Remove screws (5, figure 8-1) and remove propeller spinner assembly (7).

(2) Remove screws (6) and remove fluid delivery tube assembly (4) from propeller spinner assembly (7).

NOTE

Fluid delivery tubes are a friction fit with anti-icing ring.

b. Cleaning. Clean propeller spinner assembly with a cloth slightly dampened in dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect fluid delivery tubes for crimping and security.

(2) Inspect propeller spinner assembly for cracks around mounting holes and for dents.

d. Installation. (1) Install fluid delivery tube assembly (4, figure 8-1) on propeller spinner assembly (7). Secure with screws (6).

(2) Align propeller spinner assembly (7) on propeller (3) and secure with screws (5).

8-9. PROPELLER BLADE.

8-10. Three propeller blades are mounted to the hub of the propeller by means of blade clamps and ball bearings. The propeller counterweights are attached to the blade clamps. A link from each propeller blade clamp connects to the hydraulic piston at the front of the hub to convert

the linear motion of the piston to angular motion of the propeller blades.

a. Cleaning. Clean propeller blades with a cloth slightly moistened in dry cleaning solvent (item 6, table 1-8). Dry propeller blades with a clean, dry cloth.

b. Inspection. (1) Inspect propeller blade assembly for nicks and cracks.

(2) Inspect butt of propeller blade assembly for signs of leakage.

NOTE

A small amount of leakage may occur and is considered normal. Excessive leakage indicates seal leakage and will require a propeller change.

(3) Inspect deicer boot for cuts and abrasions.

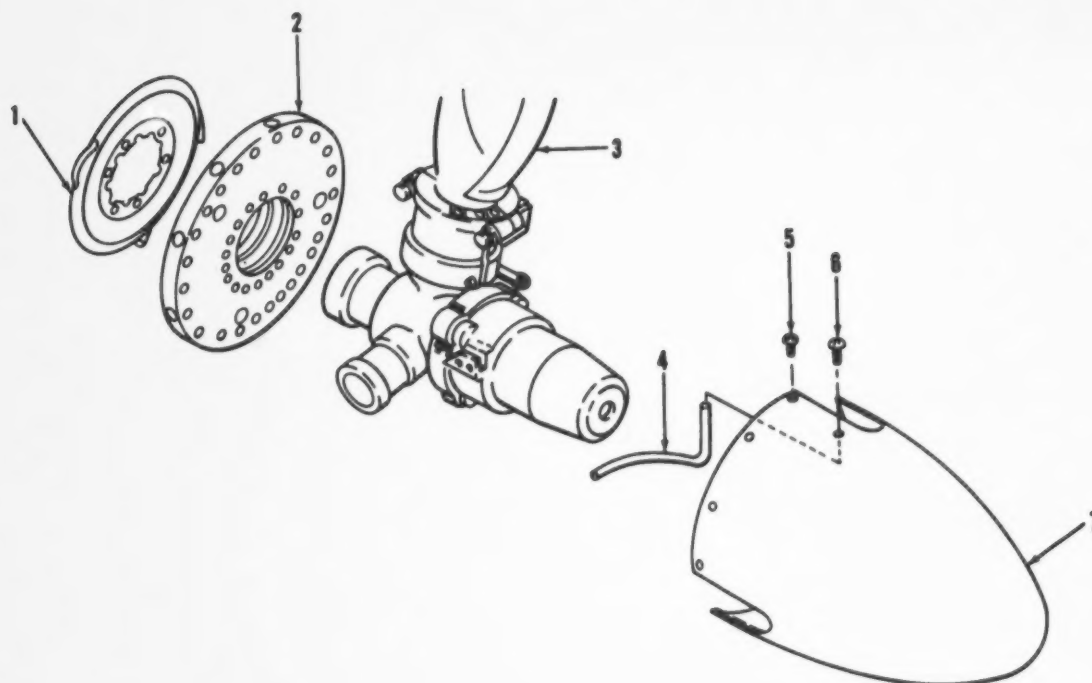
c. Lubrication. Lubricate propeller grease fittings in accordance with figure 2-1.

CAUTION

Make sure the grease fitting nearest the counterweight is removed before forcing grease into each blade clamp. Damage to seals will result if fitting is not removed.

8-11. BULKHEAD AND ANTI-ICING RING ASSEMBLY.

8-12. The bulkhead and anti-icing ring assembly are located behind the propeller. The bulkhead assembly serves as a means to attach the propeller spinner assembly to the propeller.



- | | |
|---------------------------------|-------------------------------|
| 1. Anti-icing ring assembly | 5. Screw |
| 2. Spinner bulkhead assembly | 6. Screw |
| 3. Propeller | 7. Propeller spinner assembly |
| 4. Fluid delivery tube assembly | |

Figure 8-1. Removal of propeller

The anti-icing ring assembly serves as a means to transfer anti-icing fluid from the reservoir to the fluid delivery tube assemblies located in the propeller spinner assembly. (See figure 8-1.)

a. Cleaning. Clean bulkhead and anti-icing ring assembly with a clean cloth slightly dampened in dry cleaning solvent (item 6, table 1-8). Wipe assembly dry with a clean, lint-free cloth.

b. Inspection. (1) Inspect bulkhead assembly for stripped threads and for cracks.

(2) Inspect anti-icing ring assembly for cracks and security.

8-13. PROPELLER GOVERNOR.

8-14. The propeller governor (figure 8-2) is a single-acting, self-contained unit and is located on the left side of the reduction gear unit of the engine. The propeller governor regulates engine speed by varying propeller pitch. Blade pitch is automatically maintained by means of the

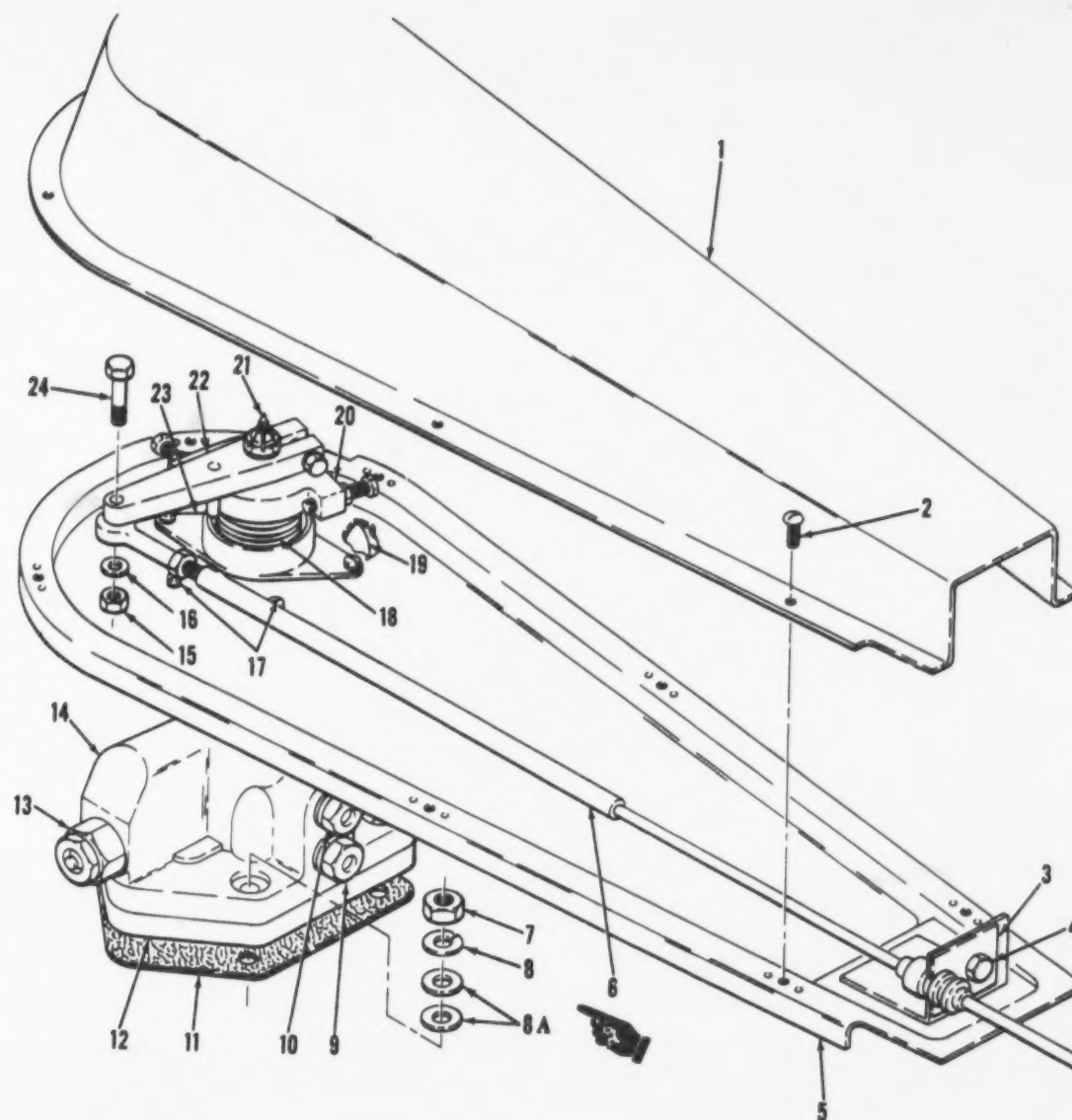
propeller governor, which has an operating range from 1850 to 2600 rpm. The gear-type pump incorporated within the propeller governor has a capacity of 5.0 qt/minute at 1750 rpm at 150 psi. The propeller governor produces oil pressure only to reduce blade pitch; an increase in blade pitch is accomplished by a feathering spring and counterweights.

a. Removal. (1) Remove screws (2, figure 8-2) attaching governor control cover (1) to governor control plate (5) and remove governor control cover.

(2) Remove nut (15), washer (16), and bolt (24) attaching governor control cable (6) to lever assembly (22).

(3) Remove bolt (4) securing control cable and remove governor control cable (6) from governor control plate (5).

(4) Remove nuts (7), lock washers (8) and flat washers (8A) securing governor assembly to engine and remove governor assembly and gasket (11).



- | | | | |
|---------------------------|---------------------|---------------------------|--------------------------|
| 1. Governor control cover | 8. Washers, lock | 13. Relief valve assembly | 19. Governor cover |
| 2. Screw | 8A. Washers, flat | 14. Governor body | 20. Stop ring |
| 3. Bracket | 9. Lower pipe plug | 15. Nut | 21. Pilot valve lift rod |
| 4. Bolt | 10. Upper pipe plug | 16. Washer | 22. Lever assembly |
| 5. Governor control plate | 11. Gasket | 17. Screws, washers | 23. Spring retainer |
| 6. Governor control cable | 12. Governor base | 18. Control lever spring | 24. Bolt |
| 7. Nut | | | |

Figure 8-2. Propeller governor

(5) Cut lock wire from screws (17) and remove screws and washers securing governor control plate (5) to governor cover (19); remove governor control plate.

NOTE

Do not remove the two screws on top of governor securing spring retainer to governor cover.

(6) Replace screws and washers (17) after removing governor control plate.

b. Cleaning. (1) Clean propeller governor with a cloth slightly dampened in dry cleaning solvent (item 6, table 1-8).

(2) Clean propeller governor mounting surface with abrasive cloth (item 31, table 1-8), if required, to remove old gasket material.

c. Inspection. (1) Inspect propeller governor mounting surface for deep scratches and cracks.

(2) Inspect propeller governor for leakage between cover and body.

(3) Ensure upper and lower pipe plugs are properly secured.

d. Installation. (1) Before installation, remove governor base, (1, figure 8-3) from governor body (3) by removing screws (6) and washers (5), and ensure oil control plugs (2 and 4) are in their proper position.

NOTE

Oil control plugs must be installed in holes stamped B for proper operation of governor. If governor body (3) is not stamped with letter B, install oil control plug (4) in the hole of governor body which aligns with hole stamped A in governor base (1). Install oil control plug (2) in hole B of governor base.

(2) Position governor base (1) on governor body (3) and secure with washers (5) and screws (6).

(3) Remove screws and washers (17, figure 8-2) from governor cover (19).

NOTE

Do not remove the two screws on top of governor securing spring retainer to governor cover.

(4) Position governor control plate (5) on governor cover (19), and secure with screws and washers (17).

(5) Secure screws and washers (17) with lock wire.

(6) Install serviceable gasket (11) on governor body (14).

NOTE

Apply a small amount of grease (item 50, table 1-8) on pump drive gear.

(7) Install governor assembly on engine studs and secure with flat washers (8A), lockwashers (8) and nuts (7). Torque nuts to 215-265 inch-pounds.

(8) Install governor control cable (6) to governor control plate (5) and secure with bracket (3) and bolt (4).

(9) Secure end of governor control cable (6) to lever assembly (22) using bolt (24), washer (16), and nut (15).

(10) Install governor control cover (1) and screws (2) to governor control plate (5).

e. Adjustment. (1) Remove governor control cover (1, figure 8-2) as outlined in step a.

(2) Adjust propeller and governor to following settings:

STATIC RPM (Full Power)	3200 ± 75 rpm at 40 inches Hg manifold pressure.
*LOW RPM (HIGH PITCH)	2350 ± 50-0
*FEATHERING RPM	2320 ± 30

*To make low rpm and feathering adjustment, first position propeller control in full high rpm and then set throttle for about 2600 rpm, to make sure of governing range.

(3) Adjust low rpm setting by pulling lever assembly back against detent, lengthening or shortening governor control linkage as required to obtain specified setting.

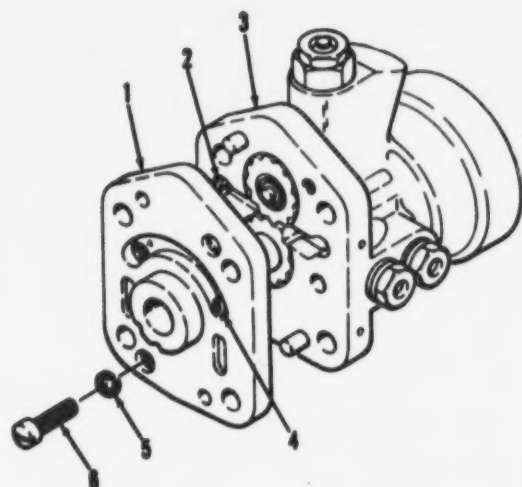
NOTE

Replace governor if proper setting cannot be obtained.

(4) Adjust for proper feathering as follows:

NOTE

During time propeller is feathering, engine is subjected to heavy loads; therefore, this check should be made as quickly as possible.



- | | |
|---------------------|---------------------|
| 1. Governor base | 4. Oil control plug |
| 2. Oil control plug | 5. Washer |
| 3. Governor body | 6. Screw |

Figure 8-3. Oil control plug locations

(a) Turn square head of pilot valve lift rod on end of shaft and worm assembly.

NOTE

Turning square head of pilot valve lift rod IN makes it feather later, and turning it OUT makes it feather sooner.

(b) Pull propeller control back through detent and note point at which rpm setting begins to fall off sharply; then bring propeller back to high rpm. Shut down engine and make IN or OUT adjustment of pilot valve lift rod as necessary.

NOTE

If adjustment given in steps (1) and (2) above do not give satisfactory results, replace governor.

(5) Perform static rpm adjustment as follows:

NOTE

The purpose of a static rpm check is to assure that full power is available. Static rpm adjustment itself is simple, but other factors governing actual static rpm must be considered: governor adjustment, propeller low pitch adjustment, effect of weather on engine performance, and wind load effect on propellers. A high static rpm is generally caused by an improper low pitch setting of propeller or high head winds.

(a) Position aircraft at right angle to wind and start engine. Change the setting of the high rpm stop screw clockwise to decrease and counterclockwise to increase the rpm. One complete turn is equivalent to approximately 25 rpm.

CAUTION

Watch engine temperature closely.

NOTE

A low static rpm normally will be result of a malfunction of engine.

(b) Check fuel system and ignition system for malfunction before governor settings are changed.

(c) Ensure governor linkage allows lever assembly to contact low pitch stops.

CHAPTER 9

FLIGHT CONTROLS

SECTION I SCOPE

9-1. PURPOSE.

9-2. The purpose of this chapter is to provide the essential information for maintenance personnel to accomplish organizational maintenance on the flight controls in accordance with the Main-

tenance Allocation Chart. (Refer to Appendix B.)

9-3. DESCRIPTION.

9-4. The flight controls for U-8 aircraft consist of the control surfaces and the flight controls which operate the surfaces.

SECTION II CONTROL SURFACES

9-5. DESCRIPTION.

9-6. The control surfaces consist of the ailerons, wing flaps, elevators, rudders, and trim tabs.

9-7. AILERONS.

9-8. Each aileron (27, figure 9-1) is constructed of magnesium alloy with a one-piece skin, beaded chordwise for reinforcement. The ailerons are attached to the outboard trailing edge of the wings and are chemically treated, externally and internally, to resist corrosion. Each aileron has a moveable trim tab (47) and a fixed trim tab (28) attached to the trailing edge and five weight assemblies (16 through 19, and 23) attached to forward leading edge.

a. Removal. (1) Remove access cover on underside of left wing and patch plug on underside of right wing to gain access to control rod (30, figure 9-1) in each wing.

(2) Remove bolts (29), washers (61), and nuts (60) connecting rods (30) to aileron trim tab actuator in left wing and to rear spar in right wing.

(3) Place a protective cover on wings just forward of ailerons (27).

(4) Remove screws (15, 22, and 26) and washers (14, 21, and 25) securing each aileron (27) to aileron brackets (13, 20, and 24).

(5) Pull each aileron (27) straight aft and off of aileron brackets (13, 20, and 24). Lay each aileron (27) on protective cover on each wing.

(6) Remove screws attaching ends of bonding cables at aileron brackets (13 and 20).

(7) Remove bolt (9), washer (7), and nut (4) connecting control rod assemblies to aileron bracket (20).

(8) Remove bolts (3, 8, and 12), washers (2, 6, and 11), and nuts (1, 5, and 10) and remove aileron brackets (13, 20, and 24) from wing brackets.

(9) Position aileron brackets (13, 20, and 24) on each aileron (27) and install washers (14, 21, and 25) and screws (15, 22, and 26).

NOTE

Ailerons (27) are balanced with aileron brackets (13, 20, and 24) installed.

(10) Remove ailerons (27) from protective cover on wings.

b. Cleaning. Clean ailerons in accordance with paragraph 1-159.

c. Inspection. (1) Inspect ailerons for dents, cracks, corrosion, and loose or missing rivets.

(2) Inspect aileron brackets for bends, cracks, elongated bolt holes and corrosion.

d. Installation. (1) Remove screws (15, 22, and 26, figure 9-1) and remove aileron brackets (13, 20, and 24) from each aileron (27).

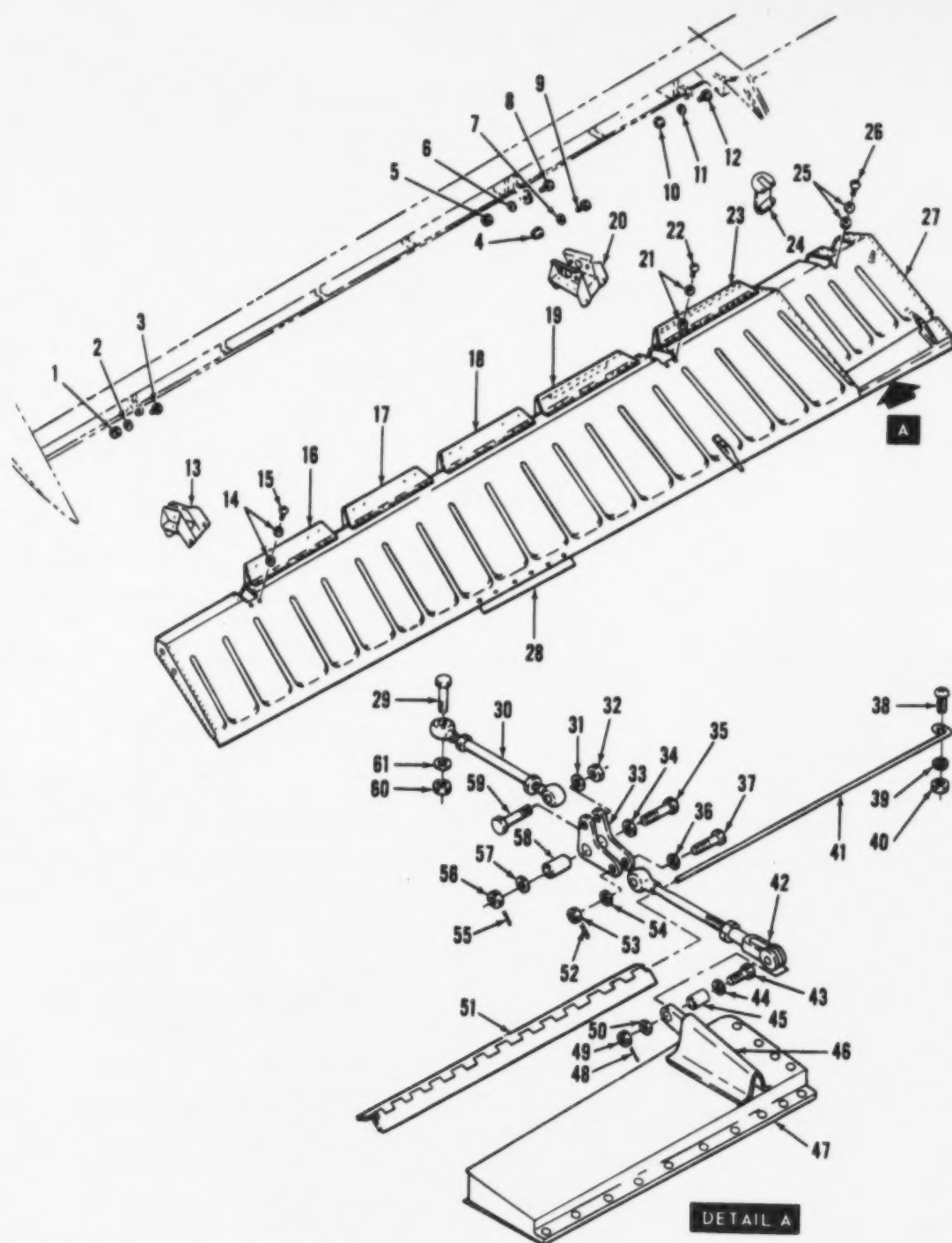


Figure 9-1. Aileron installation (sheet 1 of 2)

1. Nut	17. Weight assembly	32. Nut	47. Aileron trim tab
2. Washer	18. Weight assembly	33. Bellcrank assembly	48. Cotter pin
3. Bolt	19. Weight assembly	34. Washer	49. Nut
4. Nut	20. Aileron bracket	35. Bolt	50. Washer
5. Nut	21. Washers	36. Washer	51. Hinge
6. Washer	22. Screw	37. Bolt	52. Cotter pin
7. Washer	23. Weight assembly	38. Screw	53. Nut
8. Bolt	24. Aileron bracket	39. Washer	54. Washer
9. Bolt	25. Washers	40. Nut	55. Cotter pin
10. Nut	26. Screw	41. Hinge pin	56. Nut
11. Washer	27. Aileron	42. Control rod	57. Washer
12. Bolt	28. Fixed trim tab	43. Bolt	58. Bushing
13. Aileron bracket	29. Bolt	44. Washer	59. Bolt
14. Washers	30. Control rod	45. Bushing	60. Nut
15. Screw	31. Washer	46. Horn	61. Washer
16. Weight assembly			

Figure 9-1. Aileron installation (sheet 2 of 2)

(2) Position aileron brackets (13, 20, and 24) on wing brackets on each wing and install bolts (3, 8, and 12), washers (2, 6, and 11), and nuts (1, 5, and 10).

(3) Lay ailerons (27) on protective covers on wings with trailing edges forward.

(4) Position ends of control rod assemblies on aileron brackets (20) and secure with bolts (9), washers (7), and nuts (4).

(5) Position ends of bonding cables on each aileron (27) near aileron brackets (13 and 20) and secure with screws.

(6) Lift and position each aileron on aileron brackets (13, 20, and 24), while guiding control rods (30) into wings.

CAUTION

Ensure that aileron brackets (13, 20, and 24) are in proper position on aileron skin and inter-reinforcing structure. The top and bottom segments of the aileron brackets must enter ailerons (27) at the same time to avoid tearing the aileron skin.

(7) Align holes of aileron brackets (13, 20, and 24) with holes in ailerons (27) and install washers (14, 21, and 25) and screws (15, 22, and 26).

(8) Position control rod (30) onto aileron trim tab actuator in left wing and install bolt (29) washer (61), and nut (60).

(9) Position control rod (30) on rear spar in right wing and install bolt (29) washer (61), and nut (60).

(10) Install patch plug on right wing and access cover on left wing.

(11) Align ailerons (27), if required, in accordance with paragraph 9-33.

9-9. AILERON TRIM TABS.

9-10. An aileron trim tab (47) figure 9-1) is attached to the inboard trailing edge of each aileron (27). Both aileron trim tabs operate as antiservo tabs. The movement of the ailerons in either direction causes the aileron trim tabs to move farther in the same direction, and provides the antiservo action. The aileron trim tab on the left aileron is adjustable in flight and is connected to aileron trim tab actuator by a control rod (30), bellcrank assembly (33), and control rod (42). The aileron trim tab on the right aileron is connected to the rear spar in the right wing by a control rod (30), bellcrank assembly (33), and control rod (42).

a. Removal. (1) Remove cotter pin (48, figure 9-1), bolt (43), washers (44 and 50), nut (49), and bushing (45), and remove end of control rod (42) from horn (46) on each trim tab (47).

(2) Remove screw (38), washer (39), and nut (40) securing end of each hinge pin (41).

(3) Remove each hinge pin (41) and remove each aileron trim tab (47) from aileron.

(4) Remove access cover from underside of left wing and patch plug from underside of right wing to gain access to forward end of each control rod (30).

(5) Remove bolts (29), washers (61), and nuts (60) and remove end of control rod (30) from aileron trim tab actuator in left wing and rear spar in right wing.

(6) Remove cotter pins (52), bolts (37), washers (36 and 54), and nuts (53) and remove control

rods (42) from bellcrank assemblies (33) in ailerons (27).

(7) Remove bolts (59), washers (31), and nuts (32) and remove control rods (30) from bellcrank assemblies (33) in ailerons (27).

(8) Remove bolts (35), washers (34 and 57), nuts (56), bushings (58), and bellcrank assemblies (33) from ailerons (27).

b. Cleaning. (1) Clean aileron trim tabs in accordance with paragraph 1-157.

(2) Clean control rods and bellcrank assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect aileron trim tabs for cracks, dents, corrosion, and loose or missing rivets.

(2) Inspect control rods for bends, cracks, corrosion, and rod end bearings for free movement.

(3) Inspect bellcrank assemblies for cracks, bends, corrosion, and elongated bolt holes.

d. Installation. (1) Position bellcrank assemblies (33, figure 9-1) in ailerons (27) and install bushings (58), bolts (35), washers (34 and 57), and nuts (56).

(2) Position control rods (30) in ailerons (27) on bellcrank assemblies (33) and install bolts (59), washers (31) and nuts (32).

(3) Position control rods (42) in ailerons (27) on bellcrank assemblies (33) and install bolts (37), washers (36 and 54), nuts (53), and cotter pins (52).

(4) Position forward end of control rods (30) on aileron trim tab actuator in left wing and rear spar in right wing and install bolts (29) washers (61), and nuts (60).

(5) Position an aileron trim tab (47) on inboard trailing edge of each aileron (27) and install hinge pin (40). Secure end of hinge pins with screws (38), washers (39), and nuts (40).

(6) Position aft end of each control rod (42) on horn (46) on each aileron trim tab (47) and install bushings (45), bolts (43), washers (44 and 50), nuts (49), and cotter pin (48).

(7) Check aileron trim tabs for correct travel as specified in table 9-1.

(8) Rig aileron trim tab control system, if required, in accordance with paragraph 9-44. Ensure that turnbuckles are secured with lock wire.

(9) Install access cover on underside of left wing and patch plug on underside of right wing.

9-11. AILERON FIXED TRIM TABS.

9-12. An aileron fixed trim tab (28, figure 9-1) is constructed from sheet metal and is riveted

to the trailing edge of each aileron (27). The aileron fixed trim tabs are adjustable on the ground for lateral trim of the aircraft.

a. Removal. (1) Remove rivets attaching aileron fixed trim tab (28, figure 9-1) to trailing edge of each aileron.

(2) Remove aileron fixed trim tab from each aileron.

b. Cleaning. Clean aileron fixed trim tabs in accordance with paragraph 1-159.

c. Inspection. Inspect aileron fixed trim tab for cracks, dents, and corrosion.

d. Installation. (1) Position new aileron fixed trim tab (28, figure 9-1) on trailing edge of each aileron.

(2) Drill holes in new aileron fixed trim tabs using holes in ailerons as guide.

(3) Secure new aileron fixed trim tabs to ailerons with rivets.

(4) Adjust aileron fixed trim tabs in accordance with step e.

e. Adjustment. Once the aileron fixed trim tab (28, figure 9-1) on each aileron (27) has been adjusted, it should need no further adjustment unless the aileron has been replaced or rerigged. Adjust aileron fixed trim tabs after test flight as follows:

(1) Clamp a block on each side of left aileron fixed trim tab (28) and bend slightly in direction left aileron trim tab (47) was deflected during test flight.

NOTE

The right aileron fixed trim tab will be bent in opposite direction from left aileron trim tab. A deflection of 1/16-inch will compensate for approximately 2 degrees of trim of left aileron trim tab (50).

(2) Test fly aircraft and repeat adjustment as necessary for hands-off flight with aileron trim tabs (47) in neutral.

NOTE

Test fly aircraft after each adjustment.

9-13. WING FLAPS.

9-14. The outboard and inboard wing flaps (25 and 26, figure 9-2) are constructed of aluminum alloy with a magnesium alloy stressed skin. There are four wing flaps on each U-8 aircraft, two on each wing. The wing flaps are attached to the trailing edge of the wings, between the inboard end of the ailerons and the fuselage. Each wing flap is chemically treated, internally

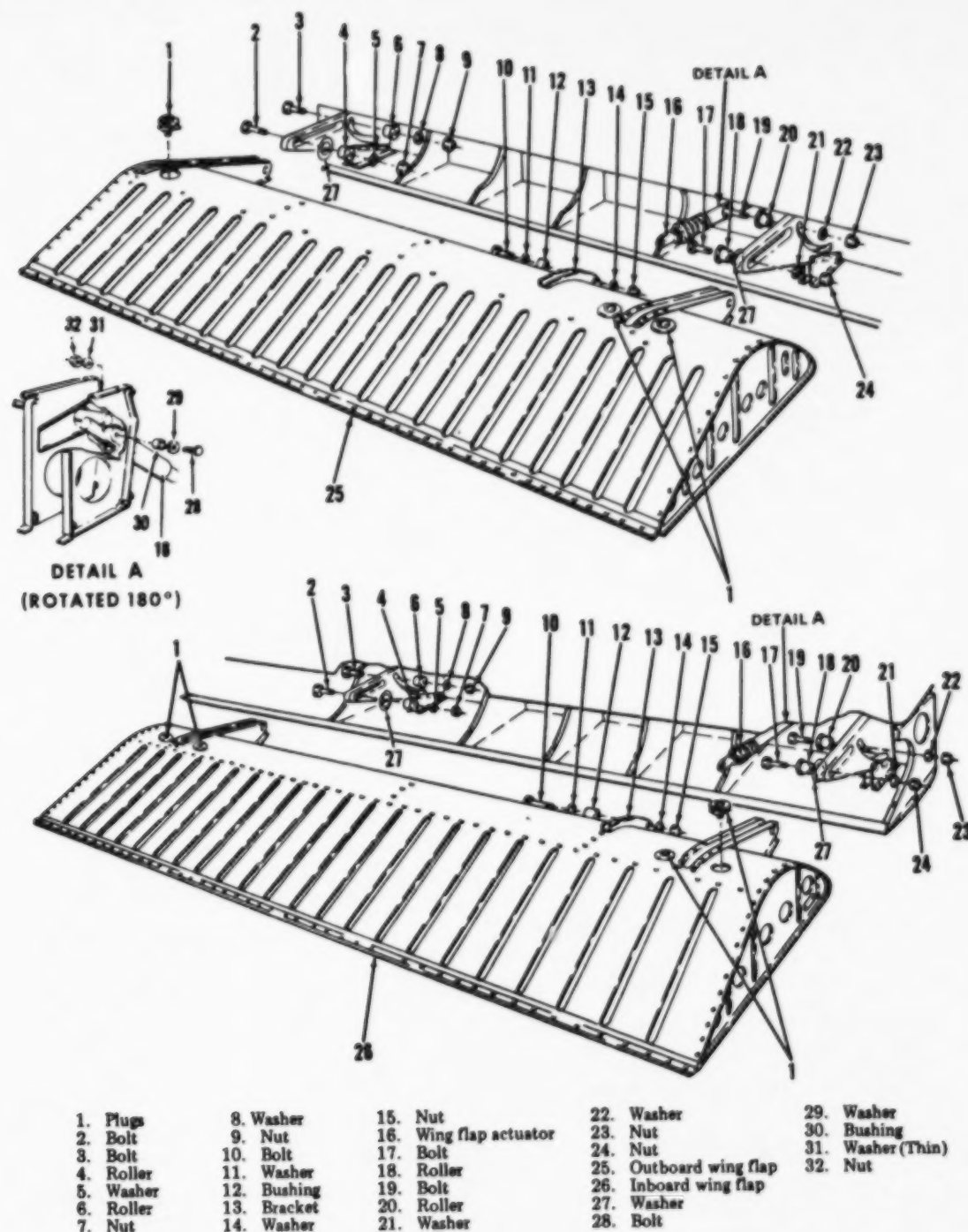


Figure 9-2. Wing flaps

and externally, to resist corrosion.

a. Removal. Remove each wing flap as follows:

(1) Place wing flap control switch in DOWN position as soon as wing flaps are fully down, place wing flap control switch in OFF position.

(2) Disconnect wing flap actuator (16, figure 9-2) from bracket (13) by removing bolt (10), washers (11 and 14), and nut (15). Remove end of wing flap actuator from bracket and remove bushing (12) from end of wing actuator.

(3) Loosen screws and remove plugs (1) from wing flap.

(4) Remove screws and nuts and remove end of bonding cables from flap brackets.

(5) Remove bolts (3 and 19), washers (8 and 22), and nuts (9 and 23) connecting forward end of flap brackets to forward track of wing brackets.

(6) Support wing flap. Remove bolts (2 and 17), washers (5 and 21), and nuts (7 and 24) and remove wing flap.

(7) Remove rollers (4, 6, 18, and 20) and, when installed, washer (27), from tracks of wing brackets.

b. Cleaning. Clean wing flaps in accordance with paragraph 1-159.

c. Inspection. (1) Inspect wing flaps for cracks, dents, loose or missing rivets, and corrosion.

(2) Inspect wing flap brackets for bends, cracks, and security of attachment.

(3) Inspect the flap tracks for wear. The wear may be dressed smooth with light emory cloths to prevent roller binding. The maximum width of the two roller slots shall not exceed .785 inch. The minimum thickness of the flap tracks shall not be less than .3125 inch. Tracks and rollers should be kept clean and lubricated with dry spray lubricant. The teflon washers should be kept in good condition.

d. Installation. Install each wing flap as follows:

NOTE

To reduce flap track wear and vibration damage, washer (27) may be installed between flap track and shoulder of rear rollers (4 and 18). When washer (27) is installed on one roller (4 or 18) the remaining rear roller or affected flap assembly will also require installation of washer (27).

(1) Position rollers (6 and 20, figure 9-2) in forward tracks of wing brackets and rollers (4 and 18) with washer (27), if used, in rear tracks of wing brackets.

NOTE

When installing flap track roller ensure flange is facing toward center of flap on which it is being installed.

(2) Position wing flap onto wing brackets and install bolts (2, 3, 17, and 19), washers (5, 8, 21, and 22), and nuts (7, 9, 23, and 24).

NOTE

Install bolts with head on the outboard side of wing and flap brackets.

(3) Install plugs (1) in wing flap and tighten screw.

(4) Position bonding cables on flap brackets and install screws and nuts.

(5) Position bushing (12) in end of wing flap actuator (16) and position end of actuator on bracket (13). Install washer (11) on bolt (10) and install bolt, washer (14), and nut (15).

(6) Check wing flap for alignment. Refer to paragraph 9-57 or 9-65.)

9-15. ELEVATORS.

9-16. There are two elevators (15, figure 9-3) used on U-8 aircraft. One type of elevator is constructed of magnesium alloy; the other of aluminum alloy. The magnesium alloy elevator has a beaded skin, while the aluminum alloy elevator has a smooth skin. Both type elevators are chemically treated, internally and externally, to resist corrosion. Each elevator has an elevator trim tab (14) attached.

NOTE

Both types of elevators are completely interchangeable and need not be installed in matched set, except for appearance.

a. Removal. (1) Remove tailcone. (Refer to paragraph 4-228.)

(2) Remove bolts (12, figure 9-3), washers (10 and 11), and nuts (9) attaching elevator torque tubes to elevator horn.

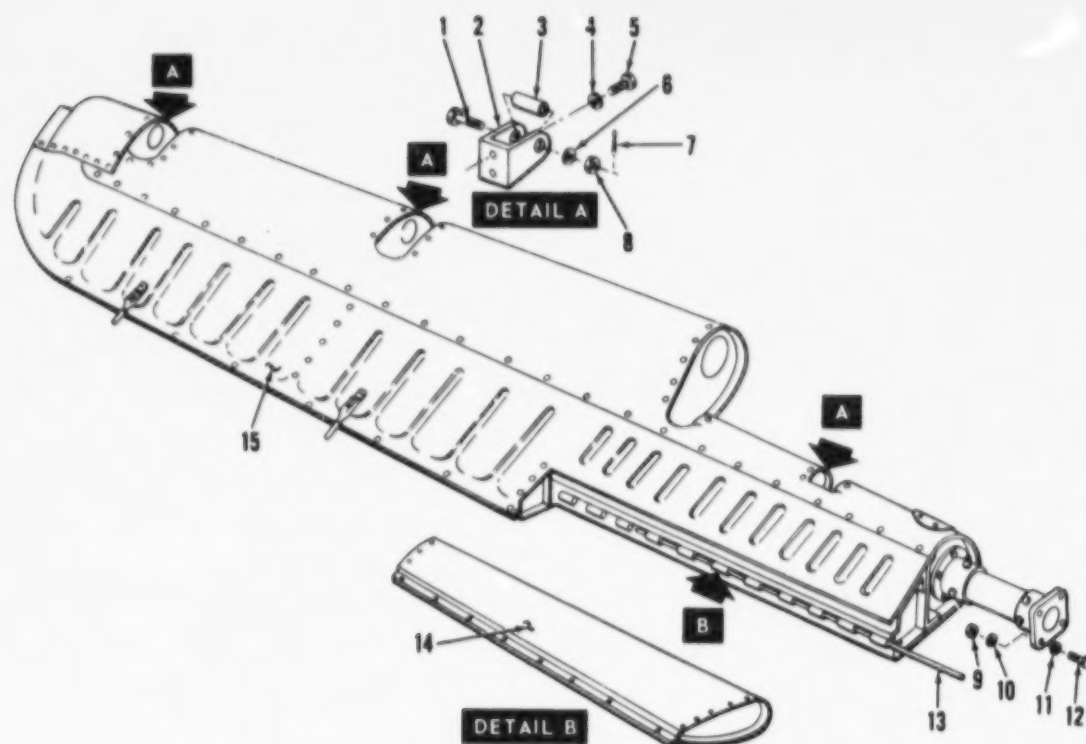
(3) Remove cotter pins, bolts, washers, and nuts connecting control rods to trim tab actuators. Remove end of control rods and bushings from end of trim tab actuators.

(4) Remove lock wire from bolts (5).

(5) Support elevators and remove bolts (5) and washers (4) attaching brackets (9) on elevators (15). Remove elevators.

(6) Remove cotter pins (7), bolts (1), washers (6), and nuts (8) and remove brackets (2) and sleeves (3) from brackets on horizontal stabilizer.

b. Cleaning. Clean elevators in accordance with



- | | | | |
|------------|---------------|------------|-----------------------|
| 1. Bolt | 5. Bolt | 9. Nut | 13. Hinge pin |
| 2. Bracket | 6. Washer | 10. Washer | 14. Elevator trim tab |
| 3. Sleeve | 7. Cotter pin | 11. Washer | 15. Elevator |
| 4. Washer | 8. Nut | 12. Bolt | |

Figure 9-3. Elevator installation

paragraph 1-159.

c. Inspection. (1) Inspect elevators for cracks, dents, corrosion, and loose or missing rivets.

(2) Inspect brackets for binds, cracks, elongated pivot holes, and corrosion.

d. Installation. (1) Position sleeves (3, figure 9-3) and brackets (2) of horizontal stabilizers and install bolts (1), washers (6), nuts (8), and cotter pins (7).

(2) Position elevators (15) on brackets (2) and install washers (4) and bolts (5). Secure bolts with lock wire.

(3) Position elevator torque tubes on elevator horns and install bolts (12), washers (10 and 11), and nuts (9).

(4) Install bushings in end of trim tab actua-

tors and position control rods of elevator trim tabs on bushings. Secure control rods in position with bolts, washers, nuts, and cotter pins.

(5) Check rigging of elevator and elevator trim tabs in accordance with paragraph 9-73 or 9-79.

(6) Install tail cone. (Refer to paragraph 4-228.)

9-17. ELEVATOR TRIM TABS.

9-18. The elevator trim tabs (14, figure 9-3) are attached to the inboard trailing edges of the elevators by piano-type hinges. The elevator trim tabs are connected to the elevator trim tab actuators by control rods.

a. Removal. (1) Remove cotter pin, bolt, and nut connecting each control rod to horn on underside of each elevator trim tab (14, figure 9-3).

(2) Remove each hinge pin (13) securing each elevator trim tab (14) to trailing edge of each elevator (15). Remove each elevator trim tab.

b. Cleaning. Clean elevator trim tabs in accordance with paragraph 1-159.

c. Inspection. Inspect elevator trim tabs for cracks, holes, dents, corrosion, and loose or missing rivets. Inspect hinge and hinge pin for excessive wear.

d. Installation. (1) Position each elevator trim tab (14, figure 9-3) on inboard trailing edge of each elevator (15) and install each hinge pin (13).

(2) Position aft end of each control rod on horn on underside of each elevator trim tab (14) and secure with bolt, nut, and cotter pin.

9-19. RUDDER.

9-20. The rudder (9, figure 9-4) is constructed of magnesium alloy. The main ribs and balance horn are constructed of aluminum alloy. The skin of the spar is beaded chordwise for reinforcement. The rudder is attached to the trailing edge of the vertical stabilizer. The rudder is chemically treated, externally and internally, to resist corrosion.

a. Removal. (1) Remove tail cone. (Refer to paragraph 4-228.)

(2) Remove cotter pins (14, figure 9-4), bolts (17), washers (16), and nuts (15) securing rudder torque tube fitting on rudder bellcrank.

(3) Remove cotter pin, bolt, washers, and nut securing control rod of rudder trim tab to rudder trim tab actuator. Remove end of control rod and bushing from rudder trim tab actuator.

(4) Remove lock wire from bolts (1).

(5) Support rudder (9) and remove bolts (1) and washers (2) securing brackets (5) to rudder. Remove rudder.

(6) Remove cotter pins (7), bolts (3), washers (4), and nuts (6) securing brackets (5) on hinge of vertical stabilizer and remove brackets and sleeves (8).

(7) Position brackets (5) on rudder (9) and install bolts (1) and washers (2).

NOTE

Rudder is balanced with brackets (5) installed.

b. Cleaning. Clean rudder in accordance with

paragraph 1-159.

c. Inspection. (1) Inspect rudder for cracks, dents, loose or missing rivets, and corrosion.

(2) Inspect brackets for bends, cracks, elongated pivot holes, and corrosion.

d. Installation. (1) Remove bolts (1, figure 9-4) and washers (2) securing brackets (5) on rudder (9) and remove brackets.

(2) Position brackets (5) and sleeves (8) on hinge of vertical stabilizer and install bolts (3), washers (4), nuts (6), and cotter pins (7).

(3) Position rudder (9) on rudder bellcrank and brackets (5) and install bolts (1) and washers (2) in brackets. Secure bolts with lock wire.

(4) Install bolts (17), washers (16), nuts (15), and cotter pins (14) to secure rudder torque tube fitting on rudder bellcrank.

(5) Position bushing in end of rudder trim tab actuator, position aft end of control rod on bushing, and install bolt, washer, nut, and cotter pin.

(6) Check alignment of rudder (9) and rudder trim tab (12) in accordance with paragraphs 9-99 and 9-111.

(7) Install tail cone. (Refer to paragraph 4-228.)

9-21. RUDDER TRIM TAB.

9-22. The rudder trim tab (12, figure 9-4) is attached to the trailing edge of the rudder by a piano-type hinge. The rudder trim tab is connected to the rudder trim tab actuator by a control rod.

a. Removal. (1) Remove cotter pin, bolt, washer, and nut securing end of control rod to tab horn (11, figure 9-4).

(2) Remove hinge pin (13) and remove rudder trim tab (12) from rudder (9).

b. Cleaning. Clean rudder trim tab in accordance with paragraph 1-159.

c. Inspection. Inspect rudder trim tab for cracks, dents, holes, corrosion, and loose or missing rivets.

d. Installation. (1) Position rudder trim tab (11, figure 9-4) on trailing edge of rudder (9) and install hinge pin (13).

(2) Position end of control rod on tab horn (11) and secure with bolt, washer, nut, and cotter pin.

9-23. RUDDER FIXED TRIM TAB.

9-24. The rudder fixed trim tab (10, figure 9-14) consists of a metal tab and is attached

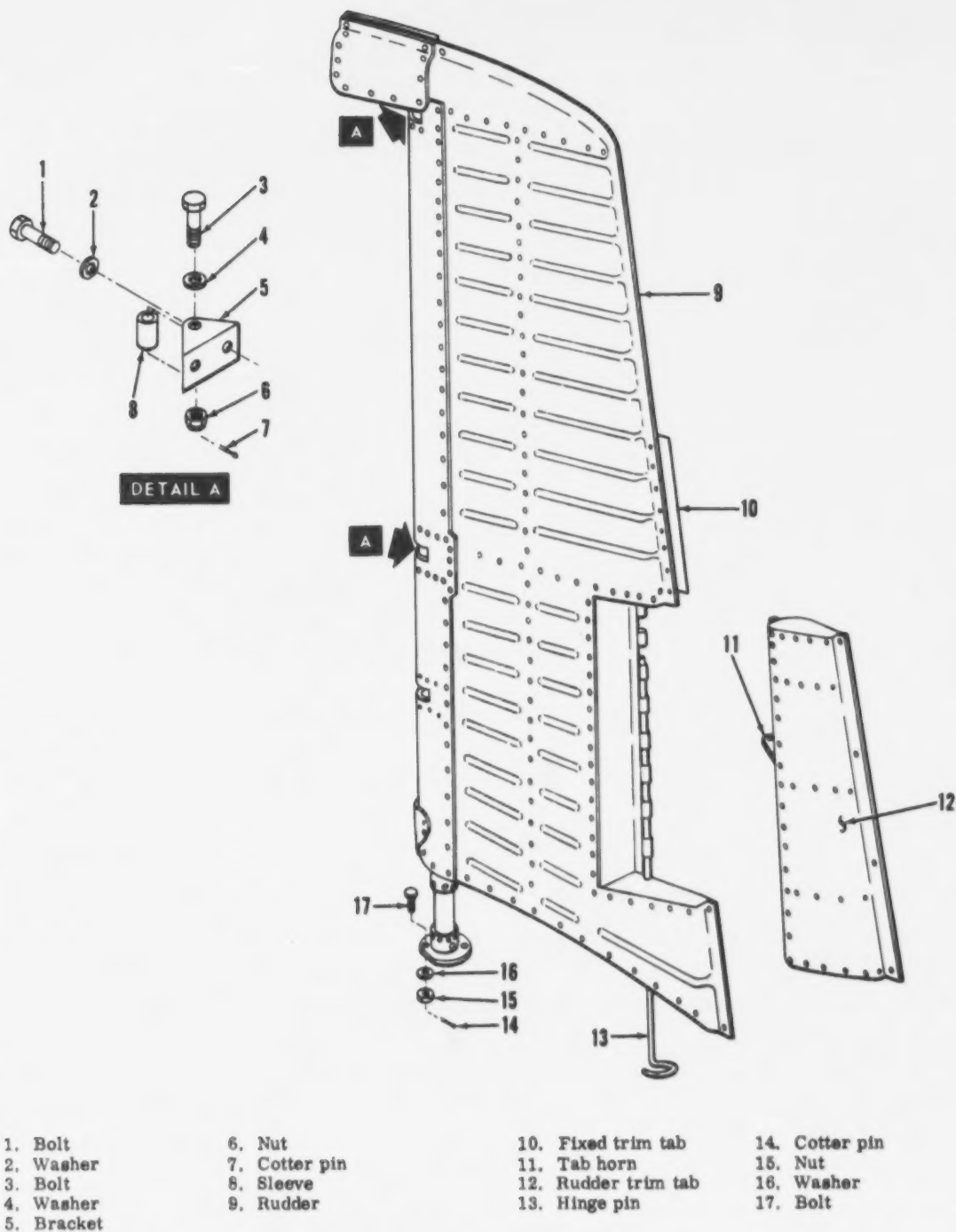


Figure 9-4. Rudder installation

to the trailing edge of the rudder assembly. The rudder fixed trim tab is used to adjust for aircraft yaw.

a. Removal. Remove rivets securing rudder fixed trim tab to rudder. Remove rudder fixed trim tab.

b. Cleaning. Clean rudder fixed trim tab in accordance with paragraph 1-159.

c. Inspection. Inspect rudder fixed trim tab for cracks, dents, and corrosion.

d. Installation. (1) Position new rudder fixed trim tab on trailing edge of rudder.

(2) Using existing holes in rudder as guide, drill holes in new rudder fixed trim tab.

(3) Secure rudder fixed trim tab to rudder with rivets.

e. Adjustment. Once the rudder fixed trim tab has been adjusted, it should need no further adjustment unless the rudder has been replaced

or rigged. Adjust rudder fixed trim tab after test flight as follows:

(1) Place a smooth wooden block on each side of the rudder fixed trim tab and secure with C clamps.

(2) Bend rudder fixed trim tab to the right to adjust for aircraft yaw to the right or to the left for yaw to the left.

(3) Test fly aircraft and repeat adjustment as necessary for hands-off flight with rudder trim tab (12, figure 9-4) in neutral.

NOTE

Test fly aircraft after each adjustment.

9-24. Control surfaces are to be bonded in accordance with Table 9-4.

SECTION III FLIGHT CONTROLS

9-25. DESCRIPTION.

9-26. The flight controls consist of the control column assembly, aileron control systems, aileron trim tab control system, wing flap control system, elevator control system, elevator trim tab control system, rudder control system, and rudder trim tab control system.

9-27. CONTROL COLUMN ASSEMBLY. (U-8D, RU-8D)

9-28. The control column assembly consists of a single control arm assembly or dual control arm and control tube assembly. The single control arm assembly consists of a control wheel (1, figure 9-5) and single control arm (10). The single control arm consists of two bearings, two sprockets, and a chain assembly installed in the single control arm. The dual control arm assembly consists of control wheels (11 and 14) and dual control arm (15). The dual control arm consists of a dual sprocket, two single sprockets and two chain assemblies installed in the dual control arm. The control tube assembly for the single or dual control arm assembly consists of a rotating tube (4), push-pull-tube (9), link assemblies (5), torque knee assembly (6), sprocket (8), and hanger fitting (7). The control wheel(s) operates the aileron control system and the forward and aft movement of the control column assembly operates the elevator control system. Inspect the control column

assembly as follows:

a. Inspect control tube assembly for cracks, dents, bends, worn sprocket, corrosion, and security of attachment.

b. Inspect single or dual control arm for cracks, dents, bends, worn sprockets, and security of attachment.

c. Inspect control wheel(s) for alignment, free and easy movement, and security of attachment.

9-29. CONTROL COLUMN ASSEMBLY.(U-8G)

9-30. The control column assembly consists of a dual control arm assembly and control tube assembly. The dual control arm assembly consists of control wheels (1 and 4, figure 9-6) and a dual control arm (5). The dual control arm consists of a dual sprocket, two single sprockets, and two chain assemblies installed in the dual control arm. The dual control tube assembly consists of a rotating tube (11), push-pull-tube (6), link assemblies (7), torque knee assembly (8), sprocket (10), and hanger fitting (9). The control wheels operate the aileron control system, and the forward and aft movement of the control column assembly operates the elevator control system. Inspect the control column assembly as follows:

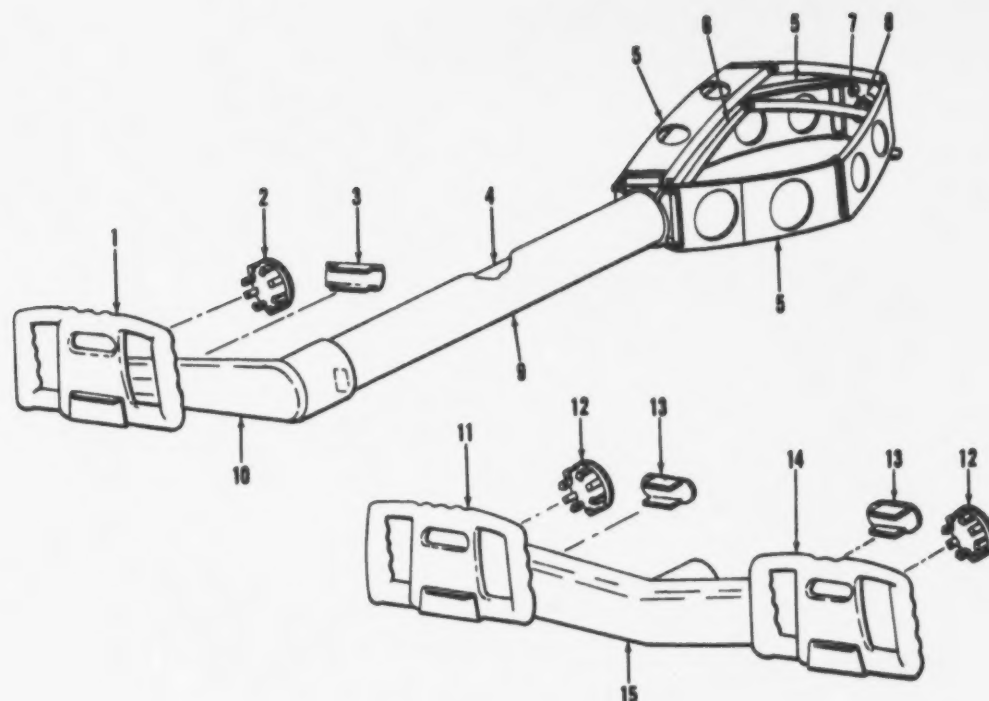
a. Inspect control tube assembly for cracks, dents, bends, worn sprockets, corrosion, and security of attachment.

b. Inspect dual control arm for cracks, dents, bends, worn sprockets, corrosion, and security

Table 9-4. Control surface bonding

SURFACE	LOCATION	NUMBER REQUIRED	BONDING JUMPER
Ailerons	Outboard hinges	2	MS 25083-1AA6
Ailerons	Center hinges	2	MS 25083-1AA8
Wing flaps	All hinges	8	MS 25083-1AA6
Elevators	Outboard hinges	4	MS 25083-1BB4
Rudder	Upper hinges	2	MS 25083-1BB4
Trim Tabs	NA	NA	NA

Install in manner of existing bondings and/or in accordance with Chapter 3, TM 55-1500-204-25/1.



1. Control wheel
2. Button
3. Cover
4. Rotating tube
5. Link assembly

6. Torque knee assembly
7. Hanger fitting
8. Sprocket
9. Push-pull tube
10. Single control arm

11. Control wheel
12. Button
13. Cover
14. Control wheel
15. Dual control arm

Figure 9-5. Control column assembly (U-8D and RU-8D)

of attachment.

c. Inspect control wheels for alignment, free and easy movement, and security attachment.

9-31. CONTROL COLUMN ASSEMBLY. (U-8F)

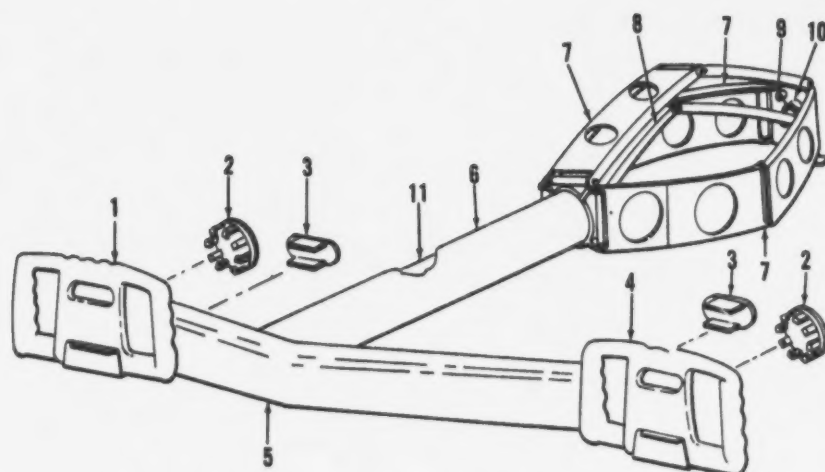
9-32. The control column assembly consists of control wheels (4 and 8, figure 9-7), weld assemblies (3 and 7), universal joints (2 and 6), sprockets (1 and 9), and tee weld assembly (5). Control rod (10) of the elevator control system is connected to the lower end of the tee weld assembly. The control wheels operate the aileron control system and forward and aft movement of the control column assembly oper-

ates the elevator control system. Inspect the control column assembly as follows:

- a. Inspect weld assemblies for cracks, dents, bends, corrosion, and security of attachment.
- b. Inspect control wheels for alignment, free and easy movement, and security of attachment.

9-33. AILERON CONTROL SYSTEM.

9-34. The aileron control systems for the U-8D, U-8G, RU-8D, and U-8F aircraft are similar in that all U-8 aircraft utilize the same ailerons, quadrant assembly, bellcrank assemblies, control rod assemblies, control cables, pulleys, and fairleads in the wing areas. The U-8D and RU-



- | | | |
|------------------|-------------------------|-------------------|
| 1. Control wheel | 5. Dual control arm | 9. Hanger fitting |
| 2. Button | 6. Push pull tube | 10. Sprocket |
| 3. Cover | 7. Link assembly | 11. Rotating tube |
| 4. Control wheel | 8. Torque knee assembly | |

Figure 9-6. Control column assembly (U-8G)

8D aircraft use a control tube assembly with either a single or dual control arm assembly (figure 9-5), and the U-8G aircraft uses the same control tube assembly with a dual control arm assembly (figure 9-6). Since the U-8F differs from the other three configurations by incorporating a dual control wheel arrangement connected to a tee weld assembly (figure 9-7), the aileron controls from the quadrant assembly to the control wheel(s) must differ in the U-8F. These differences are illustrated in figure 9-8. Rigging is accomplished as follows:

a. Rig the U-8D, U-8G, and RU-8D as follows:

(1) Remove rear passenger seats, carpet, and floorboards. Refer to paragraphs 4-63, 4-82, 4-84, 4-120.

(2) Remove access covers on underside of both wings, as necessary, to gain access to aileron controls. (See figure 1-7).

(3) Adjust control cables (45, figure 9-8) routed between control column assembly and quadrant assembly (9) as follows:

(a) Remove lock wire and loosen turnbuckles (44) to relieve tension from control cables (45).

(b) Position control column assembly in neu-

tral and install control lock. (Refer to paragraph 1-105.)

(c) Position quadrant assembly (9) in neutral position (quadrant arms parallel with centerline of aircraft) and install a rigging pin.

NOTE

Rigging pin may be any bolt or rod 3/16-inch in diameter and about 3 inches long.

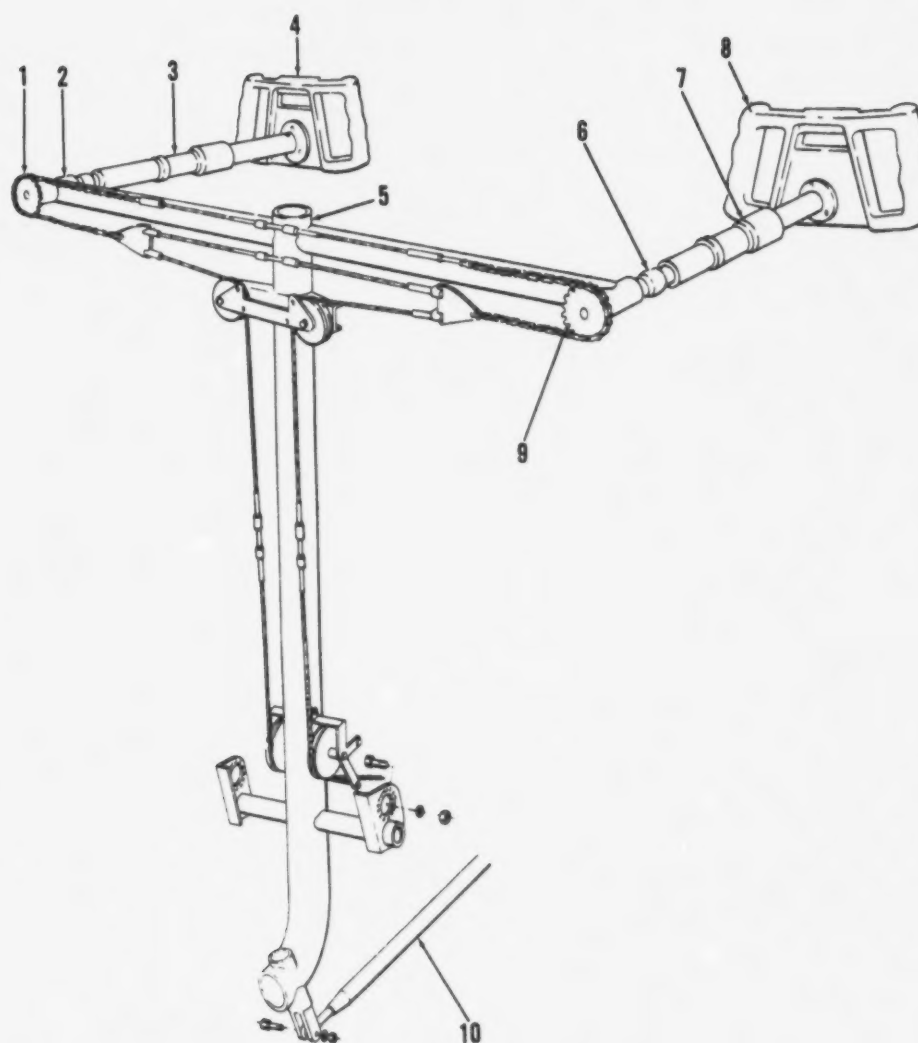
(d) Adjust control cables (45) to approximately 20 pounds in accordance with paragraph 9-123.

CAUTION

Tension shall be applied equally to each control cable (45).

(e) Remove rigging pin from quadrant assembly (9) and control lock from control column assembly. (Refer to paragraph 1-105.)

(f) Adjust control cables (45) in accordance



- 1. Sprocket
- 2. Universal joint
- 3. Weld assembly
- 4. Control wheel
- 5. Tee weld assembly

- 6. Universal joint
- 7. Weld assembly
- 8. Control wheel
- 9. Sprocket
- 10. Control rod

Figure 9-7. Control column assembly (U-8F)

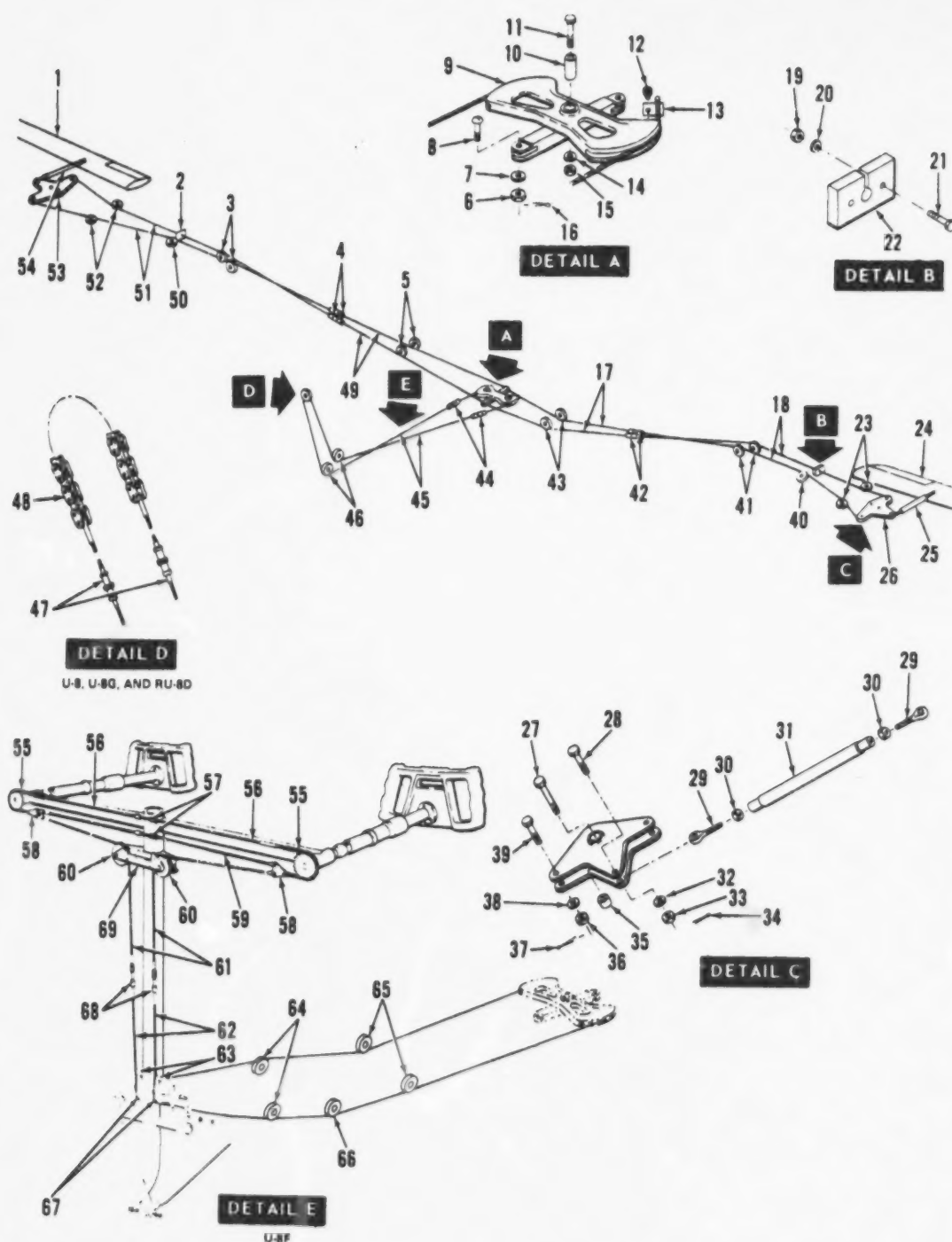


Figure 9-8. Aileron control system (sheet 1 of 2)

1. Aileron	19. Nut	36. Nut	51. Control cables
2. Fairlead	20. Washer	37. Cotter pin	52. Pulleys
3. Pulleys	21. Screw	38. Washer	53. Bellcrank assembly
4. Turnbuckles	22. Fairlead	39. Bolt	54. Control rod assembly
5. Pulleys	23. Pulleys	40. Pulley	55. Chain (U-8F)
6. Nut	24. Aileron	41. Pulleys	56. Control cable (U-8F)
7. Washer	25. Control rod assembly	42. Turnbuckles	57. Turnbuckles (U-8F)
8. Bolt	26. Bellcrank assembly	43. Pulleys	58. Link (U-8F)
9. Quadrant assembly	27. Bolt	44. Turnbuckles (U-8D, U-8G, RU-8D)	59. Control cable (U-8F)
10. Spacer	28. Bolt	45. Control cables (U-8D, U-8G, RU-8D)	60. Pulley (U-8F)
11. Bolt	29. Rod end	46. Pulleys (U-8D, U-8G, RU-8D)	61. Control cables (U-8F)
12. Screw	30. Nut	47. Turnbuckles (U-8D, U-8G, RU-8D)	62. Control cables (U-8F)
13. Plate	31. Tube	48. Chain (U-8D, U-8G, RU-8D)	63. Cable guards (U-8F)
14. Washer	32. Washer	49. Control cables	64. Pulleys (U-8F)
15. Nut	33. Nut	50. Pulley	65. Pulleys (U-8F)
16. Cotter pin	34. Cotter pin		66. Pulley (U-8F)
17. Control cables	35. Spacer		67. Pulleys (U-8F)
18. Control cables			68. Turnbuckles (U-8F)
			69. Pulley bracket (U-8F)

Figure 9-8. Aileron control system (sheet 2 of 2)

with paragraph 9-123, while maintaining quadrant assembly (9) and control column assembly in neutral position.

(g) Secure turnbuckles (44) with lock wire.

(4) Adjust control cables (17 and 18) in left wing or control cables (49 and 51) in right wing as follows:

(a) Remove lock wire from turnbuckles (4 and 42) and loosen turnbuckles.

(b) Install rigging pin in accordance with step (3) above.

(c) Position bellcrank assembly (26 or 53) in neutral position (control rod assembly (25 or 54) parallel with bellcrank arms) by adjusting turnbuckles (4 or 42).

(d) Adjust control cables (17 or 18; 49 or 51) in accordance with paragraph 9-33.

(e) Secure turnbuckles (4 or 42) with lock wire.

(5) Align ailerons (1 and 24) as follows:

(a) Position protractor or aileron travel board, part No. 50-590091, FSN 5120-545-6078, on wing at station 198.485 so that protractor or aileron travel board is parallel with wing chord.

NOTE

When aileron travel board is properly positioned, the aileron trailing edge will just clear the aileron travel board.

(b) Check each aileron (1 and 24) for a neutral setting. Shorten or lengthen control rod assembly (25) to align aileron (24) and control rod assembly (54) to align aileron (1).

NOTE

When aileron control system is properly rigged, threads on rod ends (29) will be visible through access hole at each end of control rod assemblies (25 and 54).

(c) Adjust stops on support brackets for bellcrank assemblies (26 and 53) to adjust ailerons (1 and 24) to travel limits specified in table 9-1.

(d) Remove rigging pin from quadrant assembly (9).

(e) Check aileron control system for ease of operation and proper response to movement of control wheel.

WARNING

Ensure that ailerons (1 and 24) respond properly to control wheel movement. Rotate control wheel counterclockwise (as viewed from pilot's seat) and check that aileron (24) is in up position and aileron (1) is in down position. Rotate control wheel clockwise and check that aileron (24) is in down position and aileron (1) is in up position.

(6) Install floorboard, carpet, and passenger seats and access covers on underside of wings. (Refer to paragraphs 4-63 or 4-120, and 4-82 and 4-84.)

Table 9-1 Control surface travel

CONTROL SURFACE	DEGREES	INCHES*	MEASURING POINT*
Aileron	20 ± 1-1/2 up 20 ± 1-1/2 down	2-31/32 ± 5/32 up 2-31/32 ± 5/32 down	Centerline of trailing edge, outboard end, to centerline of wing tip trailing edge.
Aileron Trim Tab (LH only)	7-1/2 ± 1-1/2 up 7-1/2 ± 1-1/2 down	7/8 ± 1/8 up 7/8 ± 1/8 down	Centerline of trailing edge, outboard end, to centerline, trailing edge of aileron.
Aileron Antiservo Tab	14 + 2 - 1 up 8 + 2 - 1 down		
Elevator	25 ± 1-1/2 up 15 ± 1-1/2 down	6 ± 5/16 up 3 ± 1/4 - 21/32 down	Measure from neutral setting to level ground and subtract or add to neutral measurement.
Elevator Trim Tab	10 ± 1-1/2 up 21 ± 1-1/2 down	3/4 ± 1/16 up 1-1/2 ± 1/16 down	Centerline, trailing edge, at outboard end, to centerline, trailing edge of elevator.
Elevator Antiservo Tab	12 up 8 down		
Rudder	25 ± 1-1/2 left 25 ± 1-1/2 right	12-29/32 ± 1/2 left 12-29/32 ± 1/2 right	With rudder in neutral, place a reference line on the tail cone. Measure from reference line.
Rudder Trim Tab	30 ± 1-1/2 left 30 ± 1-1/2 right	5-5/32 ± 5/32 left 5-5/32 ± 5/32 right	Centerline of trailing edge of trim tab to centerline of trailing edge of rudder.
Wing Flaps	30 ± 1 down	9 ± 1/2 down	Measure from level ground to trailing edge in up position, then in down position and subtract.
* Note Measurements in inches may be used for rigging rudder and rudder trim tab only. Otherwise these measurements are for quick reference only and are not to be used for rigging purposes.			

b. Rig the U-8F as follows:

(1) Remove left forward seat, carpet, and floor webs in cabin just forward of main spar. (Refer to paragraphs 4-191, 4-206, and 4-208.)

(2) Remove two access covers from left seat deck just aft of main spar.

(3) Remove access covers from underside of each wing to gain access to ends of control rod assemblies (25 and 54, figure 9-8).

(4) Adjust chains (55) and control cables (56 and 59) in accordance with paragraph 9-123.

(5) Place control wheels in neutral position and install control lock. (Refer to paragraph 1-105.)

(6) Position quadrant assembly (9) in neutral position and install rigging pin.

NOTE

Rigging pin may be any bolt or rod 3/16-inch in diameter and about 3 inches long.

(7) Adjust control cables (61 and 62) in accordance with paragraph 9-123.

CAUTION

Tension shall be applied equally to each control cable (61 and 62).

(8) Adjust turnbuckles (4 and 42) until bellcrank assemblies (26 and 53) are in neutral position (control rod assemblies (25 and 54) parallel with arms of bellcrank assemblies).

(9) Adjust control cables (17, 18, 49, and 51) in accordance with paragraph 9-123.

CAUTION

Tension shall be applied equally to each control cable (17, 18, 49, and 51).

(10) Place a protractor or aileron travel board, part No. 50-590091, FSN 5120-545-6078, on wing at station 198.485 so that protractor or aileron travel board is parallel with wing chord.

NOTE

When protractor or aileron travel board is properly positioned, the aileron trailing edge will just clear the protractor or aileron travel board.

(11) Check each aileron (1 and 24) for a

neutral setting. Shorten or lengthen control rod assembly (25) to align aileron (24) and control rod assembly (54) to align aileron (1).

NOTE

When aileron control system is properly rigged, threads on ends (29) will be visible through access hole at each end of control rod assemblies (25 and 54).

(12) Adjust stops on support brackets for bellcrank assemblies (26 and 53), to adjust ailerons (1 and 24) to travel limits specified in table 9-1.

(13) Remove rigging pin from quadrant assembly (9) and control lock from control column assembly. (Refer to paragraph 1-105.)

(14) Check aileron control system for ease of operation and proper response to movement of control wheel.

WARNING

Ensure that ailerons (1 and 24) respond properly to control wheel movement. Rotate control wheel counterclockwise (as viewed from pilot's seat) and check that aileron (24) is in up position and aileron (1) is in down position. Rotate control wheel clockwise and check that aileron (24) is in down position and aileron (1) is in up position.

(15) Install access covers on underside of each wing.

(16) Install access covers on left seat deck just aft of main spar.

(17) Install floor web, carpet, and left forward seat in cabin. (Refer to paragraphs 4-208, 4-206, and 4-191.)

9-35. QUADRANT ASSEMBLY.

9-36. The quadrant assembly (9, figure 9-8) is located below the left floorboard of the cabin. Control cables (17 and 49) are connected to the arms of the quadrant assembly and control cables (45 or 62) are connected to the outboard ends of the quadrant assembly.

a. Removal. (1) Install control lock on control column assembly (refer to paragraph 1-105, steps (1) through (3) and support ailerons (1 and 24, figure 9-8) in a neutral position.

(2) Remove seat, carpet, and floor web from left rear of cabin. (Refer to paragraphs 4-191, 4-206, and 4-208.)

(3) Remove lock wire and loosen turnbuckles (4, 42, and 44 or 68) to relieve tension from control cables (17, 49, and 45 or 62).

(4) Remove screws (12), plates (13), and control cables (45 or 62) from quadrant assembly (9).

(5) Remove cotter pins (16), bolts (8), washers (7), and nuts (6), and remove ends of control cables (17 and 49) from arms of quadrant assembly (9).

(6) Remove bolt (11), washer (14), nut (15), and spacer (10) securing quadrant assembly (9) on support bracket. Remove quadrant assembly.

b. Cleaning. Clean quadrant assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect quadrant assembly for cracks, dents, bends, corrosion and elongated bolt holes.

d. Installation. (1) Position quadrant assembly (9, figure 9-8) and spacer (10) on support bracket and install bolt (11), washer (14), and nut (15).

(2) Position ends of control cables (17 and 49) on arms of quadrant assembly (9) and secure with bolts (8), washers (7), nuts (6), and cotter pins (16).

(3) Position plates (13) and control cables (45 or 62) on quadrant assembly (9) and install screws (12).

(4) Remove control lock from control column assembly and supports from under ailerons (1 and 24).

(5) Adjust control cables (17, 49, and 45 or 62) to tensions given in table 9-2 and table 9-3. Align ailerons (1 and 24), as necessary, in accordance with paragraph 9-33.

(6) Install access panels on underside of wings, and install floor web, carpet, and seat in cabin. (Refer to paragraphs 4-191, 4-206, and 4-208.)

9-37. BELLCRANK AND CONTROL ROD ASSEMBLIES.

9-38. The bellcrank assemblies (26 and 53, figure 9-8) and control rod assemblies (25 and 54) are located in the wings. The bellcrank assemblies are connected to the ailerons (1 and 24) by the control rod assemblies.

a. Removal. (1) Install control lock on control column assembly (paragraph 1-105, steps (1) through (3) and support ailerons (1 and 24,

figure 9-8) in neutral position.

(2) Remove access covers from under side of wings below bellcrank (26 and 58).

(3) Remove lock wire and loosen turnbuckles (4 and 42) to relieve tension from control cables (18 and 51).

(4) Remove cotter pins (37), bolts (39), washers (38) and nuts (36), and remove end of control cables (18 and 51) from bellcrank assemblies (26 and 53).

(5) Remove cotter pins (34), bolts (28), washers (32), and nuts (33) and remove ends of control rod assemblies (25 and 54) from bellcrank assemblies (26 and 53).

(6) Remove lock wire and remove bolts (27) from bellcrank assemblies (26 and 53).

(7) Remove bellcrank assemblies (26 and 53) and spacers (35) from support brackets in wings.

(8) Disconnect ailerons (1 and 24) from wings in accordance with paragraph 9-7.

(9) Remove bolts, washers, and nuts, and remove ends of control rod assemblies (25 and 54) from aileron brackets.

(10) Remove control rod assemblies (25 and 54) from wings.

(11) Loosen nuts (30) and remove rod ends (29) from tubes (31).

b. Cleaning. Clean bellcrank and control rod assemblies with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect bellcrank assemblies for cracks, bends, corrosion, and elongated bolt holes.

(2) Inspect control rod assemblies for cracks, bends, and corrosion.

(3) Inspect rod ends for malformed threads and worn or damaged bearings.

d. Installation. (1) Position bellcrank assemblies (26 and 53, figure 9-8) and spacers (35) on support brackets in wings and install bolt (27). Secure bolt with lock wire.

(2) Install rod ends (29) in tubes (31) and tighten nuts (30).

(3) Position control rod assemblies (25 and 54) on bellcrank assemblies (26, and 53) and install bolts (28), washers (32), nuts (33), and cotter pins (34).

(4) Position ends of control cables (18) on bellcrank assembly (26) and control cables (51) on bellcrank assembly (53) and secure with bolts (39), washers (38), nuts (36), and cotter pins (37).

(5) Position ends of control rod assemblies (25 and 54) on aileron brackets and secure with bolts, washers, and nuts.

(6) Connect ailerons (1 and 24) to wings in accordance with paragraph 9-7, and remove supports from under ailerons.

Table 9-2. Control cable tension (U-8D, U-8G, and RU-8D)

CONTROL CABLE	SIZE	TENSION IN POUNDS
Aileron Control Cables	3/16 inch	50 + 5 - 0
Aileron Control Cables	1/8 inch	30 + 5 - 0
Elevator Control Cables	1/8 inch	45 + 4 - 4
Rudder Control Cables	3/16 inch	35 + 5 - 0
Rudder Trim Tab	1/16 inch	10 + 3 - 2
Control Cables		
Elevator Trim Tab	1/16 inch	10 + 3 - 2
Control Cables		
Elevator Trim Tab	1/16 inch	5 + 2 - 0
Control Cables (Aft of Y splice)		
Aileron Trim Tab Control Cables	1/16 inch	10 + 3 - 2

Table 9-3 Control cable Tension (U-8F)

CONTROL CABLE	SIZE	TENSION IN POUNDS
Control Cables and Chains on Control Column Assembly		70 + 10 - 10
Aileron Control Cables	3/16 inch	50 + 5 - 0
Aileron Control Cables	1/8 inch	40 + 5 - 0
Elevator Control Cables	1/8 inch	31 + 4 - 4
Rudder Control Cables	3/16 inch	75 + 5 - 0
Aileron Trim Tab Control Cables	1/16 inch	10 + 3 - 2
Rudder Trim Tab Control Cables	1/16 inch	10 + 3 - 2
Elevator Trim Tab Control Cables	1/16 inch	10 + 3 - 2

(7) Rig aileron control system, as required, in accordance with paragraph 9-33.

(8) Install access covers on under side of wings.

9-39. CONTROL CABLES AND CHAIN. (U-8D, U-8G, RU-8D)

9-40. The control cables (17, 18, 45, 49, and 51, figure 9-8) used in the aileron control system are constructed of highly flexible, corrosion-resistant steel. The control cables (45) are connected to a chain (48) on a sprocket at the forward end of the control column assembly, then routed around pulleys (46) to the quadrant assembly (9). Control cables (17 and 18) in left wing are routed from the quadrant assembly around pulleys (43, 41, 40, and 23) and through fairlead (22) to bellcrank assembly (26). Control cables (49 and 51) in right wing are routed from quadrant assembly around pulleys (5, 3, 50, and 52) and through fairlead (2) to bellcrank assembly (53). The pulleys are pre-

lubricated to ensure free movement of the control cables.

a. Removal. (1) Remove seat, carpet, and floor boards from left rear of cabin. (Refer to paragraphs 4-63, 4-82, and 4-84, or 4-120, 4-131, and 4-133.)

(2) Remove access covers from underside of wings, as necessary, to gain access to pulleys and bellcrank assemblies.

(3) Support ailerons (1 and 24, figure 9-8) in neutral position.

(4) Remove lock wire and disconnect turnbuckles (47) from control cables (45). Remove chain (48) from sprocket of control column assembly.

NOTE

Before disconnecting turnbuckles (47), mark one tooth of sprocket and corresponding link of chain (48) with paint to ensure alignment of chain on sprocket when control cables (45) are reconnected.

(5) Connect lead lines to ends of control cables (45) at forward ends.

(6) Remove cable-retaining pins from brackets at pulleys (46).

(7) Remove screws (12) and plates (13) securing control cables (45) to quadrant assembly (9).

(8) Pull control cables (45) from aircraft structure at quadrant assembly (9).

(9) Disconnect lead lines from ends of control cables (45) and connect to quadrant assembly (9).

(10) Remove lock wire from turnbuckles (4 and 42) and disconnect turnbuckles.

(11) Remove cotter pins (16), bolts (8), washers (7), and nuts (6), and remove ends of control cables (17 and 49) from arms of quadrant assembly (9).

(12) Connect lead lines to ends of control cables (17 and 49) at quadrant assembly (9).

(13) Remove cotter pins (37), bolts (39), washers (38), and nuts (36), and remove ends of control cables (18 and 51) from bellcrank assemblies (26 and 53).

(14) Connect lead lines to ends of control cables (18 and 51) at bellcrank assemblies (26 and 53).

(15) Remove cable-retaining pins from brackets at pulleys (3, 5, 23, 40, 41, 43, 50, and 52).

(16) Remove screws (21), washers (20), and nuts (19), and remove fairleads (2 and 22).

(17) Pull control cables (17 and 18) from left wheel well and control cables (49 and 51) from right wheel well.

(18) Disconnect lead lines from ends of control cables (17, 18, 49, and 51) and connect lead lines to structure in wheel wells.

(19) Remove pulleys (3, 5, 23, 40, 41, 43, 46, 50, or 52), when required by removing bolts, washers, and nuts and removing pulleys from pulley brackets.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion.

NOTE

Replace control cables that are corroded or have six or more broken wires per inch. Replace control cables that have less than six broken wires if aircraft is to be placed on extended operation in area where replacement cables are not available.

(2) Inspect pulleys for cracks, dents, cor-

rosion, and evidence of misalignment.

(3) Inspect pulley brackets for cracks, bends, corrosion, misalignment, and security of attachment.

d. Installation. (1) Position pulleys (3, 5, 23, 40, 41, 43, 46, 50, and 52, figure 9-8), when removed, in pulley brackets and install bolts, washers, and nuts. Position lead lines in grooves of pulleys.

(2) Disconnect lead lines from quadrant assembly (9) and connect to ends of control cables (45). Pull control cables into position and disconnect lead lines.

NOTE

Coat control cables (45) with lubricating oil (item 63, table 1-8) before installing.

(3) Position aft ends of control cables (45) with plates (13) on quadrant assembly (9) and secure with screws (12).

(4) Position chain (48) on sprocket at forward end of control column assembly and align marks made at time of removal.

(5) Connect ends of control cables (45) to ends of chain (48) with turnbuckles (47).

(6) Ensure that control cables (45) are in grooves of pulleys (46) and install cable-retaining pins in pulley brackets.

(7) Disconnect lead lines from structure in each wheel well and connect to ends of control cables (17, 18, 49, and 51).

(8) Pull on lead lines at bellcrank assemblies (26 and 53) and pull control cables (18 and 51) into position in wings. Disconnect lead lines.

(9) Pull on lead lines at quadrant assembly (9) and pull control cables (17 and 49) into position and disconnect lead lines.

(10) Position ends of control cables (17 and 49) on arms of quadrant assembly (9) and secure with bolts (8), washers (7), nuts (6), and cotter pins (16).

(11) Position ends of control cables (18 and 51) on bellcrank assemblies (26 and 53) and secure with bolts (39), washers (38), nuts (36), and cotter pins (37).

(12) Connect control cables (17 and 18) with turnbuckles (42) and control cables (49 and 51) with turnbuckles (4).

(13) Position fairleads (2 and 22) on aft control cables (18 and 51) and secure with screws (21), washers (20), and nuts (19).

(14) Ensure that control cables (17, 18, 49, and 51) are in grooves of correct pulleys and install cable-retaining pins in pulley brackets.

(15) Remove supports from under ailerons (1 and 24) and rig aileron control system in ac-

cordance with paragraph 9-33. Secure all turnbuckles with lock wire.

(16) Install access covers on underside of wings and install left floor web, carpet, and seat in cabin. (Refer to paragraphs 4-63, 4-82, and 4-84, or 4-120, 4-131, and 4-133.)

9-41. CONTROL CABLES AND CHAINS.(U-8F)

9-42. The control cables in the wings of the U-8F aircraft are the same as for the U-8D, U-8G, and RU-8D aircraft. For the control cables routed from the control column assembly to the quadrant assembly of the U-8F aircraft, see figure 9-8, detail A.

a. Removal. (1) Unfasten and remove boot from around tee weld assembly (5, figure 9-7) to gain access to turnbuckles (68, figure 9-8).

(2) Remove pilot's seat and left forward seat from cabin. (Refer to paragraphs 4-159 and 4-191.)

(3) Remove carpet, floor web and access covers in flight compartment and cabin to gain access to pulleys (64, 65, and 66) and quadrant assembly (9). (Refer to paragraphs 4-175, 4-177, 4-206, and 4-208.)

(4) Remove lock wire and disconnect turnbuckles (68) from control cables (61 and 62).

(5) Remove cable retaining pins from pulley bracket (69) and remove control cables (61) from around pulleys (60).

(6) Remove lock wire and loosen turnbuckles (57).

NOTE

Paint one tooth of each sprocket and corresponding link of chains (55) to aid in positioning chains on sprockets at installation.

(7) Remove chains (55) from sprockets. Remove chains and control cables (56, 59, and 61) from control column assembly, as an assembly.

(8) Connect lead lines to ends of control cables (62) and remove cable retaining pins from cable guards (63) on each side of tee weld assembly.

(9) Remove cable retaining pins from brackets at pulleys (64, 65, and 66).

(10) Remove screws (12) and plates (13) from quadrant assembly (9) and pull control cables (62) from aircraft structure.

(11) Remove lead lines from end of control cables (62) and connect lead lines to quadrant assembly (9).

(12) Remove bolts, washers, and nuts and re-

move cable guards (63), pulley brackets (69), and pulleys (60 and 67) from tee weld assembly.

(13) Remove bolts, washers, and nuts and remove pulleys (64, 65, and 66) from brackets.

(14) Support ailerons (1 and 24) and remove access covers from underside of wings to gain access to aileron controls in wings.

(15) Remove control cables and pulleys from wings in accordance with paragraph 9-39.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin pulley with compressed air.

c. Inspection. Inspect control cables and pulleys in accordance with paragraph 9-39.

d. Installation. (1) Position pulleys (60 and 67, figure 9-8), cable guards (63), and pulley brackets (69) on tee weld assembly, with leadlines in grooves of pulleys, and install bolts, washers, and nuts.

(2) Position pulleys (64, 65, and 66) on brackets, with lead lines in grooves of pulleys, and install bolts, washers, and nuts.

(3) Disconnect lead lines from quadrant assembly (9) and connect to forward ends of control cables (62).

(4) Pull control cables (62) into position on pulleys (64, 65, 66 and 67). Install cable retaining pins in cable guards (63) and brackets of pulleys (64, 65, and 66).

(5) Position aft ends of control cables (62) on quadrant assembly (9) with plates (13) and install screws (12).

(6) Position chains (55), with control cables (56, 59, and 61) attached, on sprockets, aligning painted marks made at time of removal. Position ends of control cables (61) around pulleys (60) and install cable retaining pins in pulley brackets (69).

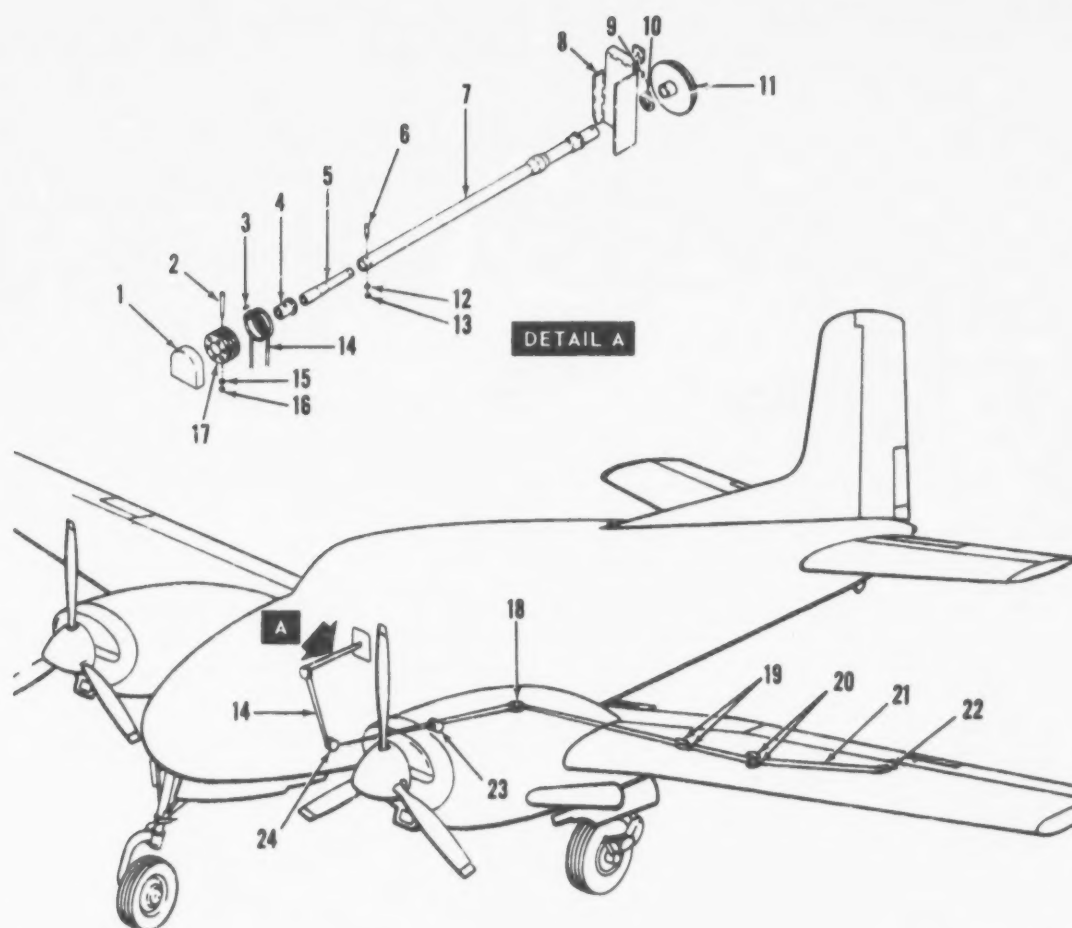
(7) Disconnect lead lines from ends of control cables (62) and connect control cables (61) to control cables (62) with turnbuckles (68).

(8) Install control cables in wings in accordance with paragraph 9-39, steps (7) through (14).

(9) Rig aileron control system in accordance with paragraph 9-33 and ensure that all turnbuckles are secured with lock wire.

(10) Remove supports from under ailerons (1 and 24) and install access covers on underside of wings.

(11) Position and install boot around tee weld assembly.



- | | | | |
|----------------|--------------------|--------------------|-------------------------------|
| 1. Cable guard | 7. Shaft | 13. Nut | 19. Turnbuckles |
| 2. Tapered pin | 8. Support bracket | 14. Control cables | 20. Pulleys |
| 3. Pin | 9. Pin | 15. Washer | 21. Control cable |
| 4. Bearing | 10. Retaining ring | 16. Nut | 22. Aileron trim tab actuator |
| 5. Shaft | 11. Knob | 17. Cable drum | 23. Pulley |
| 6. Tapered pin | 12. Washer | 18. Pulley | 24. Pulley |

Figure 9-9. Aileron trim tab control system (U-8D, U-8G, RU-8D)

(12) Install floor web, access covers, and carpet. (Refer to paragraphs 4-175, 4-177, 4-206, and 4-208.)

(13) Install pilot's seat and left forward seat in cabin. (Refer to paragraphs 4-159 and 4-191.)

9-43. AILERON TRIM TAB CONTROL SYSTEM.

9-44. The aileron trim tab control system (figure 9-9 or 9-10) consists of the aileron trim tabs, control rods, control cables, pulleys, and

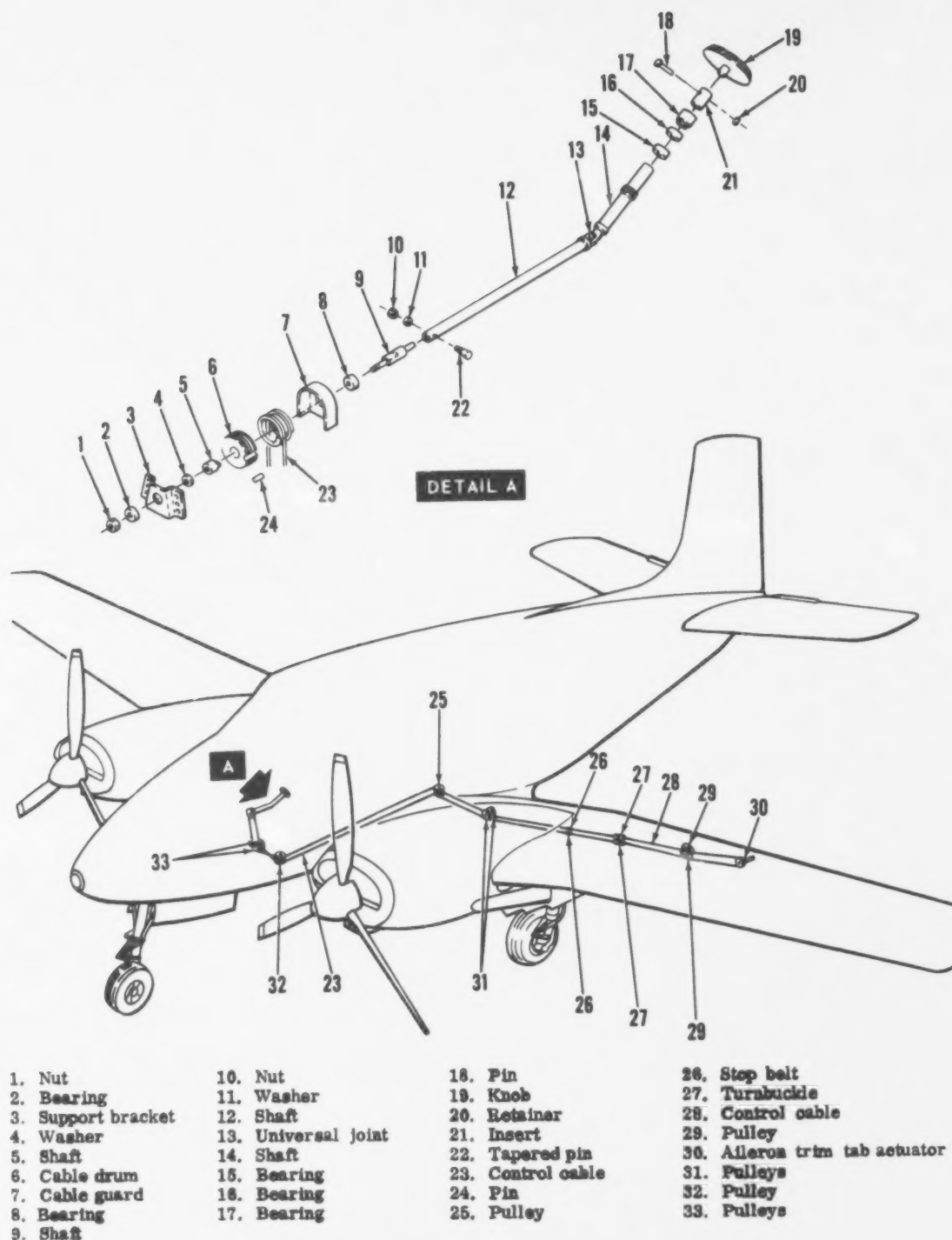


Figure 9-10. Aileron trim tab control system (U-3F)

control and position indicator assembly. The aileron trim tab control system is operated by turning the control and position indicator assembly knob. Rigging the aileron trim tab control system is accomplished as follows:

a. Rig the U-8D, U-8G, and RU-8D as follows:

(1) Adjust aileron trim tab on right aileron for correct travel as follows:

(a) Position protractor or aileron trim tab and travel board, part No. 50-590090, FSN 5220-545-6077, on right aileron adjacent to aileron trim tab.

(b) Move right aileron to full down position.

(c) Check aileron trim tab for down travel specified in table 9-1.

(d) Adjust length of control rod (42, figure 9-1), if necessary, by removing cotter pin (48), bolt (43), washers (50 and 44), nut (49), bushing (45), and clevis end of control rod (42) from horn (46).

(e) Loosen locknut on clevis end of control rod (42) and screw clevis end out or in until travel specified in table 9-1 is obtained.

(f) Tighten locknut and position clevis end of control rod (42) and bushing (45) on horn (46). Install bolt (43), washers (44 and 50), nut (49), and cotter pin (48).

(g) Move right aileron to full up position and check aileron trim tab for travel as specified in table 9-1.

(h) Adjust length of control rod (42), if necessary, in accordance with steps (d) through (f) above.

(2) Adjust tension on control cables (14 and 21, figure 9-9) and aileron trim tab on left aileron for correct travel as follows:

(a) Remove bolt (29, figure 9-1), washer (61) and nut (60) and remove end of control rod (30) from aileron trim tab actuator (22, figure 9-9).

(b) Turn knob (13) to align turnbuckles (19) in left wheel well.

(c) Remove lock wire from turnbuckles (19) and adjust control cables (14 and 21) in accordance with paragraph 9-123.

(d) Position actuator screw of aileron trim tab actuator (22) at mid-point of travel.

(e) Position end of control rod (30, figure 9-1) on end of actuator screw and check that aileron trim tab is in neutral position (aligned with aileron). Secure control rod with bolt (29), washer (61), and nut (60).

(f) Position protractor or aileron trim tab travel board, part No. 50-590090, FSN 5220-545-6077, on left aileron adjacent to aileron trim tab.

(g) Adjust aileron trim tab travel in accordance with table 9-1 by adjusting cable stop bolts

in left wheel well.

(h) Check position indicator for 0 reading with aileron trim tab in neutral position. If indicator dial does not read 0, adjust position indicator as in step (3) below.

NOTE

Perform a visual check to ensure that left aileron trim tab movement corresponds to reading of position indicator. Ensure that when right aileron is up, its aileron trim tab is up; when left aileron is up, its aileron trim tab is also up.

(3) Adjust position indicator as follows:

(a) Move aileron trim tab on left aileron to neutral position.

(b) Remove retaining ring (10, figure 9-9) and pin (9) and remove knob (11) from end of shaft (7).

(c) Remove edge light panels from left and right subpanels.

(d) Remove screws and remove escutcheons from left and right side of console.

(e) Remove screws and remove channel from beneath console.

(f) Remove screws securing hanger fitting on console and slide hanger fitting aft on push-pull tube of control column assembly.

(g) Remove screws and slide console cover aft on push-pull tube of control column assembly.

(h) Remove nut that holds indicator gear in mesh with indicator dial of position indicator and cogs on shaft (7) and disengage indicator gear.

(i) Position indicator dial of position indicator on 0. Mesh indicator gear with indicator dial and cogs on shaft (7). Secure with nut.

(j) Position console cover and hanger fitting on console and secure with screws.

(k) Position channel beneath console and secure with screws.

(l) Position escutcheons on both sides of console and secure with screws.

(m) Install edge light panels on left and right subpanels.

(n) Position knob (11) on aft end of shaft (7) and secure with pin (9) and retaining ring (10).

(o) Turn knob (11) and check aileron trim tab control system for free and easy movement. Ensure that indicator dial reads correctly as to position of aileron trim tab on left aileron.

b. Rig the U-8F as follows:

(1) Adjust aileron trim tab on right aileron for correct travel in accordance with step a.

(2) Adjust cables (23 and 28, figure 9-10)

and aileron trim tab on left aileron for correct travel as follows:

(a) Remove bolt (29, figure 9-1), washer (61), and nut (60) and remove end of control rod (30) from aileron trim tab actuator (30, figure 9-10).

(b) Turn knob (19) to align turnbuckles (27) in left wheel well.

(c) Remove lock wire from turnbuckles (27) and adjust control cables (23 and 28) in accordance with paragraph 9-123.

(d) Position actuator screw of aileron trim tab actuator (30) at mid-point of travel.

(e) Position end of control rod (30, figure 9-1) on end of actuator screw and check that aileron trim tab is in neutral position (aligned with aileron). Secure with bolt (29), washer (61), and nut (60).

(f) Position protractor or aileron trim tab travel board, part No. 50-590090, FSN 5220-545-6077 on left aileron adjacent to aileron trim tab.

(g) Adjust aileron trim tab travel in accordance with table 9-1 by adjusting stop bolts (26, figure 9-10) in left wheel well.

(h) Check position indicator for 0 reading with aileron trim tab in neutral position. If indicator dial does not read 0, adjust position indicator as in step (3) below.

NOTE

Perform a visual check to ensure that left aileron trim tab movement corresponds to reading of position indicator. Ensure that when right aileron is up; its aileron trim tab is up; when left aileron is up, its aileron trim tab is also up.

(3) Adjust position indicator as follows:

(a) Move aileron trim tab on left aileron to neutral position.

(b) Remove retainer (20), pin (18), and knob (19) from aft end of shaft (14).

(c) Remove edge light panel from pedestal.

(d) Remove access cover from right side of pedestal.

(e) Remove nut that holds indicator gear in mesh with indicator dial of position indicator and cogs on shaft (14) and disengage indicator gear.

(f) Position indicator dial of position indicator on 0. Mesh indicator gear with indicator dial and cogs on shaft (14). Secure with nut.

(g) Install access cover on right side of pedestal.

(h) Install edge light panel on pedestal.

(i) Position knob (19) on aft end of shaft (14) and install pin (18) and retainer (20).

(j) Turn knob (19) and check aileron trim tab control system for free and easy movement. Ensure that indicator dial reads correctly as to position of aileron trim tab on left aileron.

9-45. AILERON TRIM TAB ACTUATOR.(U-8D, U-8G, RU-8D)

9-46. The aileron trim tab actuator (22, figure 9-9) is located in the left wing. The aileron trim tab actuator is connected by control rods (30 and 42, figure 9-1) and bellcrank assembly (33) to the aileron trim tab on the left aileron.

a. Removal. (1) Remove access covers from underside of left wing below aileron trim tab actuator (22, figure 9-9) and pulleys (20).

(2) Remove lock wire and disconnect turnbuckles (19) from ends of control cable (21). Connect lead lines to ends of control cable.

(3) Remove cable-retaining pins from brackets at pulleys (20).

(4) Remove bolt (29, figure 9-1), washer (61), and nut (60). Remove end of control rod (30) from aft end of aileron trim tab actuator (22, figure 9-9).

(5) Remove bolts, washers, and nuts and remove aileron trim tab actuator (22) and control cable (21) out of access hole in left wing.

(6) Disconnect lead lines from ends of control cable (21) and connect to wing structure.

(7) Remove bolts, washers, and nuts and remove housing from aileron trim tab actuator (22).

(8) Remove cable pin from cable drum and remove control cable (21) from cable drum of aileron trim tab actuator (22).

b. Cleaning. Clean aileron trim tab actuator with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect aileron trim tab actuator for cracks, dents, and corrosion.

d. Installation. (1) Position exact center of control cable (21, figure 9-9) in slot of cable drum of aileron trim tab actuator (22) and install cable pin.

(2) Wrap control cable (21) around cable drum beginning at outside grooves and move in; make two turns with each end of control cable. Wrap each end in opposite direction.

(3) Position housing over cable drum and install bolts, washers, and nuts. Tape control cable (21) at housing to prevent control cable from unwinding from cable drum.

(4) Disconnect lead lines from wing structure and connect to ends of control cable (21).

(5) Pull on lead lines in left wheel well and pull control cable (21) into position. Position

aileron trim tab actuator (22) in left wing and secure with bolts, washers, and nuts.

(6) Disconnect lead lines and connect ends of control cable (21) to turnbuckles (19). Remove tape securing control cable at aileron trim tab actuator (22).

(7) Install cable-retaining pins in brackets at pulleys (20).

(8) Position end of control rod (30, figure 9-1) on aileron trim tab actuator and secure with bolt (29), washer (61), and nut (60).

(9) Rig aileron trim tab control system in accordance with paragraph 9-43. Ensure that turnbuckles (19) are secured with lock wire.

(10) Install access covers on underside of left wing below pulleys (20) and aileron trim tab actuator (22).

9-47. AILERON TRIM TAB ACTUATOR. (U-8F)

9-48. The aileron trim tab actuator (30, figure 9-10) is located in the left wing. The aileron trim tab actuator is connected by control rods (30 and 42, figure 9-1) and bellcrank assembly (33) to the aileron trim tab on the left aileron.

a. Removal. (1) Remove access covers from underside of left wing below aileron trim tab actuator (30, figure 9-10) and pulleys (29).

(2) Remove lock wire and disconnect turnbuckles (27) from end of control cable (28). Connect lead lines to ends of control cable.

(3) Remove cable-retaining pins from bracket at pulleys (29).

(4) Remove bolt (29, figure 9-1), washer (61), and nut (60). Remove end of control rod (30) from aft end of aileron trim tab actuator (30, figure 9-10).

(5) Remove bolts, washers, and nut and remove aileron trim tab actuator (30) with control cable (28) out of access hole in left wing.

(6) Disconnect lead lines from ends of control cable (28) and connect to wing structure.

(7) Remove bolts, washers, and nuts and remove housing from aileron trim tab actuator (30).

(8) Remove cable pin from cable drum and remove control cable (28) from cable drum of aileron trim tab actuator (22).

b. Cleaning. Clean aileron trim tab actuator with dry cleaning solvent (item 5, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect aileron trim tab actuator for cracks, dents, and corrosion.

d. Installation. (1) Position exact center of control cable (28, figure 9-10) in slot of cable drum of aileron trim tab actuator (30) and install cable pin.

(2) Wrap control cable (28) around cable drum beginning at outside grooves and move in; make two turns with each end of control cable. Wrap each end in opposite directions.

(3) Position housing over cable drum and install bolts, washers, and nuts. Tape control cable (28) at housing to prevent control cable from unwinding from cable drum.

(4) Disconnect lead lines from wing structure and connect to end of control cable (28).

(5) Pull on lead lines in left wheel well and pull control cable (28) into position. Position aileron trim tab actuator (30) in left wing and secure with bolts, washers, and nuts.

(6) Disconnect lead lines and connect ends of control cable (28) to turnbuckles (27). Ensure that turnbuckles are secured with lockwire. Remove tape from control cable at aileron trim tab actuator (30).

(7) Install cable-retaining pins in brackets at pulleys (29).

(8) Position end of control rod (30, figure 9-1) on aileron trim tab actuator and secure with bolt (29), washer (61), and nut (60).

(9) Rig aileron trim tab control system in accordance with paragraph 9-43.

(10) Install access covers on underside of left wing below pulleys (29) and aileron trim tab actuator (30).

9-49. CONTROL CABLES. (U-8D, U-8G, RU-8D)

9-50. The control cables (14 and 21, figure 9-9) for the aileron trim tab control system are constructed from corrosion-resistant steel wire and are 1/16-inch in diameter. Control cable (14) is installed around cable drum (17) and routed around pulleys (24, 23, and 18) to left wheel well. Control cable (21) is installed on the aileron trim tab actuator (22) in the left wing and routed around pulleys (20) to the left wheel well. The ends of the control cables are connected together by turnbuckles (19).

a. Removal. (1) Remove left rear seat, carpet, and floor web, as necessary. (Refer to paragraphs 4-63, 4-82, and 4-84, or 4-120, 4-131, and 4-133.)

(2) Remove lock wire and remove turnbuckles (19, figure 9-9) from control cables (14 and 21).

(3) Remove cable grommets in left wheel well.

(4) Connect lead lines to ends of control cable (14) in left wheel well.

(5) Remove cable-retaining pins from brackets at pulleys (18, 23, and 24).

(6) Remove tapered pins (6), washers (12),

and nuts (13) securing shaft (5) to shaft (7).

(7) Remove shaft (5) with cable drum (17), control cable (14), and cable guard (1) from shaft (7).

(8) Pull control cable (14) from fuselage structure and disconnect lead lines from ends of control cable.

(9) Remove cable guard (1), pin (3), and control cable (14) from cable drum (17).

(10) Remove control cable (21) in accordance with paragraph 9-45.

(11) Remove bolts, washers, and nuts and remove pulleys (18, 20, 23, and 24), if required, from brackets.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin pulleys with compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion.

NOTE

Replace control cables that are corroded or have three or more broken wires per inch. Replace control cables that have any broken wires if aircraft is to be placed on extended operation in area where replacement control cables are not available.

(2) Inspect pulleys for cracks, dents, corrosion, and evidence of misalignment.

(3) Inspect pulley brackets for cracks, bends, corrosion, misalignment, and security of attachment.

d. Installation. (1) Position pulleys (18, 20, 23, and 24, figure 9-9), if removed, on brackets and install bolts, washers, and nuts.

(2) Coat control cables (14 and 21) with lubricating oil (item 63, table 1-8) before installing.

(3) Install control cable (21) in accordance with paragraph 9-45.

(4) Position center of control cable (14) on cable drum (17) and install pin (3). Install cable guard (1).

(5) Position shaft (5) with control cable (14), cable drum (17), and cable guard (1) installed on shaft (7). Secure with tapered pins (6), washers (12), and nuts (13).

(6) Connect lead lines to ends of control cable (14). Pull control cable ends into fuselage and left wing structure. Disconnect lead

lines.

(7) Install cable-retaining pins in brackets at pulleys (18, 23, and 24).

(8) Install cable grommets in left wheel well.

(9) Connect control cables (14 and 21) with turnbuckles (19) in left wheel well.

(10) Rig aileron trim tab control system in accordance with paragraph 9-43. Ensure that turnbuckles (19) are secured with lock wire.

(11) Install floor web, carpet, and left rear seat. (Refer to paragraphs 4-63, 4-82, and 4-84, or 4-120, 4-131, and 4-133.)

9-51 CONTROL CABLES.(U-8F)

9-52. The control cables (23 and 28, figure 9-10) for the aileron trim tab control system are constructed from corrosion-resistant steel wire and are 1/16-inch in diameter. Control cable (23) is installed around cable drum (6) and routed around pulleys (33, 32, 25, and 31) to the left wheel well. Control cable (28) is installed on aileron trim tab actuator (30) in the left wing and routed around pulleys (29) to the left wheel well. The ends of the control cables are connected together by turnbuckles (27).

a. Removal. (1) Remove pilot's seat and left front passenger seat in cabin. (Refer to paragraphs 4-159 and 4-191.)

(2) Remove carpet and floor web, as necessary, to gain access to pulleys (25, 32, and 33, figure 9-10). (See paragraphs 4-175, 4-177, 4-206, and 4-208.)

(3) Remove lock wire and remove turnbuckles (27) from control cables (23 and 28).

(4) Remove cable grommets in left wheel well.

(5) Connect lead lines to ends of control cable (23) in left wheel well.

(6) Remove cable-retaining pins from brackets at pulleys (25, 31, 32, and 33).

(7) Remove nut (1) from forward end of shaft (9) and remove tapered pin (22), washer (11), and nut (10) securing shaft (9) to shaft (12).

(8) Remove washer (4), shaft (5), cable drum (6), cable guard (7), and shaft (9), as an assembly, from support bracket (3).

(9) Remove shafts (5 and 9) and cable guard (7) from cable drum (6).

(10) Remove pin (24) and remove control cable (23) from cable drum (6).

(11) Pull control cable (23) from fuselage structure and disconnect lead lines.

(12) Remove control cable (28) in accordance with paragraph 9-47.

(13) Remove bolts, washers, and nuts and remove pulleys (25, 29, 31, 32, and 33), if required, from brackets.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin pulleys with compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion.

NOTE

Replace control cables that are corroded or have three or more broken wires per inch. Replace control cables that have any broken wires if aircraft is to be placed on extended operation in area where replacement control cables are not available.

(2) Inspect pulleys for cracks, dents, corrosion, and evidence of misalignment.

(3) Inspect pulley brackets for cracks, bends, corrosion, misalignment, and security of attachment.

d. Installation. (1) Position pulleys (25, 29, 31, 32, and 33, figure 9-10), if removed, on brackets and install bolts, washers, and nuts.

(2) Coat control cables (23 and 28) with lubricating oil (item 63, table 1-8) before installing.

(3) Install control cable (28) in left wing in accordance with paragraph 9-47.

(4) Position center of control cable (23) on cable drum (6) and secure with pin (24). Wrap each end of control cable one and one-half turns around cable drum.

(5) Connect lead lines to ends of control cable (23) and pull ends of control cable into fuselage and wing structure.

(6) Position cable guard (7) on cable drum (6) and install shafts (5 and 9) in cable drum.

(7) Position washer (4) on end of shaft (9) and position washer, shafts (5 and 9), cable drum (6), and cable guard (7), as an assembly, on support bracket (3). Secure in position with nut (1).

(8) Position shaft (12) on end of shaft (9) and secure with tapered pin (22) washer (11), and nut (10).

(9) Position knob (19) on end of shaft (14) and secure with pin (18) and retainer (20).

(10) Disconnect lead lines from ends of control cable (23) and install cable grommets in left wheel well.

(11) Install cable-retaining pins in brackets at pulleys (25, 31, 32, and 33).

(12) Remove control cable (28) in accordance with paragraph 9-47.

(13) Rig aileron trim tab control system in accordance with paragraph 9-43. Ensure that turnbuckles (27) are secured with lock wire.

(14) Install floor web and carpet. (Refer to paragraphs 4-175, 4-177, 4-206, and 4-208.)

(15) Install left front passenger seat and pilot's seat. (Refer to paragraphs 4-159 and 4-191.)

9-53. CONTROL AND POSITION INDICATOR ASSEMBLY. (U-8D, U-8G, RU-8D)

9-54. The control and position indicator assembly consists of knob (11, figure 9-9), shafts (5 and 7), cable drum (17), indicator dial, and gear. The indicator dial and gear are mounted on support bracket (8).

a. Removal. (1) Remove lock wire and loosen turnbuckles (19, figure 9-9) in left wheel well.

(2) Remove retaining ring (10), pin (9), and knob (11) from aft end of shaft (7).

(3) Remove edge light panels from left and right subpanels.

(4) Remove screws and remove escutcheons from left and right side of console.

(5) Remove screws and remove channel from beneath console.

(6) Remove screws securing hanger fitting and console cover on console. Slide hanger fitting and console cover aft on push-pull tube of control column assembly.

(7) Remove screws, washers, and nuts and remove indicator dial and gear from support bracket (8).

(8) Remove tapered pin (6), washers (12), and nuts (13) securing shafts (5 and 7) together.

(9) Remove shaft (5), cable drum (17), control cable (14), and cable guard (1), as an assembly, from shaft (7) and support bracket (8).

(10) Remove cable guard (1) and pin (3) securing control cable (14) on cable drum (17). Remove control cable from cable drum.

(11) Remove tapered pin (2), washer (15), and nut (16) from cable drum (17). Remove cable drum from shaft (5).

(12) Remove shaft (7) aft out of support bracket (8) and remove shaft.

b. Cleaning. Clean control and position indicator assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect shafts for cracks, bends, and corrosion.

(2) Inspect indicator dial and gear for cracks, worn cogs, and elongated screw holes.

(3) Inspect cable drum for cracks, corrosion,

and dents on cable grooves.

d. Repair or replacement. Repair of control and position indicator assembly consists of replacing any worn or damaged parts found during removal and inspection.

e. Installation. (1) Position aft end of shaft (7, figure 9-9) in support bracket (8).

(2) Position cable drum (17) on shaft (5) and install tapered pin (2), washer (15), and nut (16).

(3) Install control cable (14) on cable drum (17) and install pin (3). Install cable guard (1).

(4) Position shaft (5), cable drum (17), control cable (14), and cable guard (1), as an assembly, on shaft (7) and support bracket (8).

(5) Install tapered pins (6), washers (12), and nuts (13) securing shaft (5) to shaft (7).

(6) Position indicator dial and gear on support bracket (8). Install screws and mesh cogs of indicator dial and gear with cogs on shaft (7). Secure in position with washers and nuts.

(7) Position console cover and hanger fitting on console and secure with screws.

(8) Position channel beneath console and secure with screws.

(9) Position escutcheons on left and right side of console and secure with screws.

(10) Install edge light panels on left and right subpanels.

(11) Position knob (11) on aft end of shaft (7) and install pin (9) and retaining ring (10).

(12) Rig aileron trim tab control system in accordance with paragraph 9-43. Ensure that turnbuckles (19) are secured with lock wire.

9-55. CONTROL AND POSITION INDICATOR ASSEMBLY. (U-8F)

9-56. The control and position indicator assembly consists of knob (19, figure 9-10), shafts (5, 9, 12, and 14), cable drum (6), indicator dial, and gear. The indicator dial and gear are mounted inside of the pedestal. The gear is meshed with the cogs on shaft (14).

a. Removal. (1) Remove lock wire and loosen turnbuckles (27, figure 9-10) in left wheel well.

(2) Remove retainer (20), pin (18), and knob (19) from aft end of shaft (14).

(3) Remove edge light panel from pedestal.

(4) Remove access cover from right side of pedestal.

(5) Remove cotter pins, washers, and pins, and remove indicator dial and gear from pedestal.

(6) Remove nut (1) from forward end of shaft (9) and remove tapered pin (22) washer (11), and nut (10) securing shaft (9) to shaft (12).

(7) Remove washer (4), shaft (5), cable drum (6), cable guard (7), and shaft (9), as an assembly, from support bracket (3).

(8) Remove washer (4), shafts (5 and 9), and cable guard (7) from cable drum (6).

(9) Remove pin (24) and remove control cable (23) from cable drum (6).

(10) Remove tapered pins, washers, and nuts and remove shafts (12 and 14) from universal joint (13). Remove shafts and universal joint from pedestal.

b. Cleaning. Clean control and position indicator assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect shafts for cracks, bends, and corrosion.

(2) Inspect teeth of indicator dial and gear for cracks, dents, and worn spots.

(3) Inspect cable drum and cable guard for cracks, dents, and corrosion.

d. Repair or replacement. Repair of control and position indicator assembly consists of replacing any worn or damaged part found during removal and inspection.

e. Installation. (1) Position shafts (12 and 14, figure 9-10) and universal joint (13) in pedestal and secure with tapered pins, washers, and nuts.

(2) Position control cable (23) on cable drum (6) and secure with pin (24).

(3) Position cable guard (7) on cable drum (6) and install shafts (5 and 9) in cable drum.

(4) Position washer (4) on end of shaft (9). Position washer, shafts (5 and 9), cable drum (6), and cable guard (7), as an assembly, on support bracket (3). Secure with nut (1).

(5) Position shaft (11) on shaft (9) and secure with tapered pin (22), washer (11), and nut (10).

(6) Position knob (19) on end of shaft (14) AND INSTALL PIN (18) and retainer (20).

(7) Position indicator dial and gear in pedestal and mesh with cogs on shaft (14). Secure indicator dial and gear in position with pins, washers, and cotter pins.

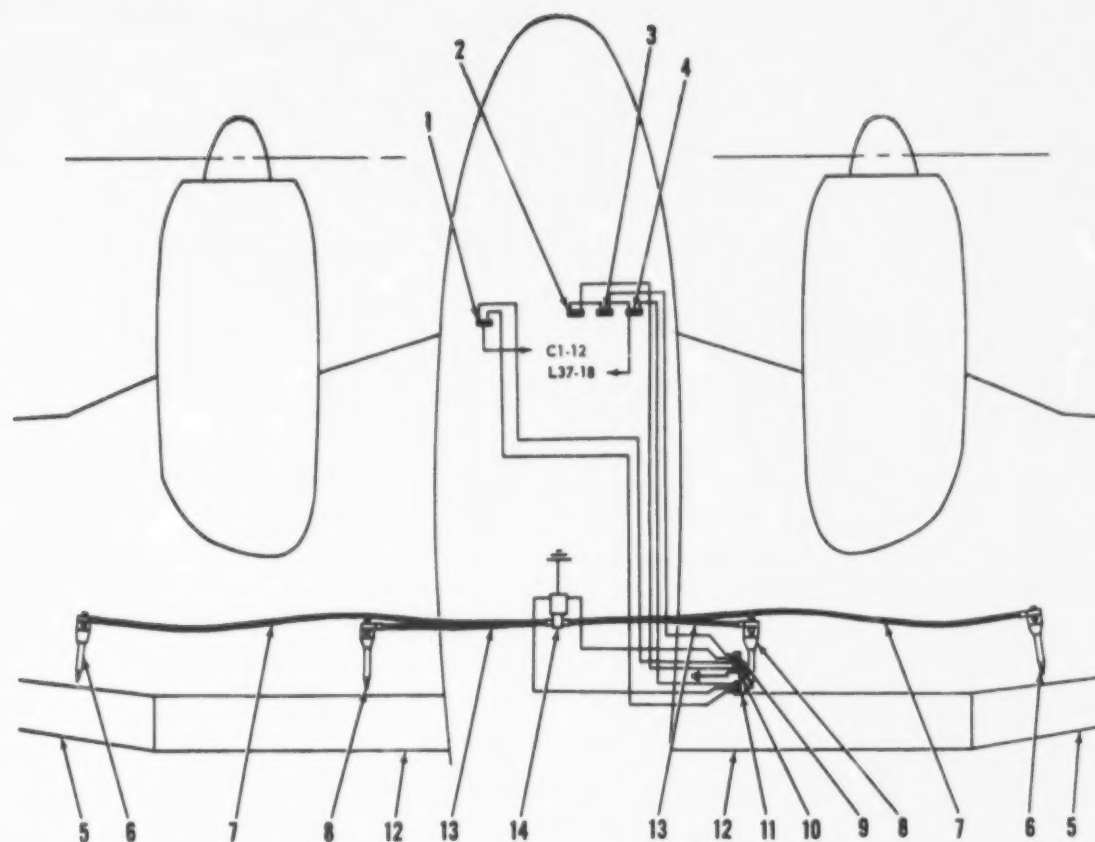
(8) Rig aileron trim tab control system in accordance with paragraph 9-43. Ensure that turnbuckles (27) in left wheel well are secured with lock wire.

(9) Install access cover on right side of pedestal.

(10) Install edge light panel on pedestal.

9-57. WING FLAP CONTROL SYSTEM. (U-8D, U-8G, RU-8D)

9-58. The wing flap control system consists of the outboard and inboard wing flaps (5 and 12,



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|--------------------------------------|---------------------------------|--|
| 1. Wing flap control switch | 6. Wing flap actuator | 11. Flap down limit switch |
| 2. Flap 20-degree position indicator | 7. Flexible shaft | 12. Inboard wing flap |
| 3. Flap up position indicator | 8. Wing flap actuator | 13. Flexible shaft |
| 4. Flap down position indicator | 9. Flap up limit switch | 14. Wing flap motor and gear box assembly. |
| 5. Outboard wing flap | 10. Flap 20-degree limit switch | |

Figure 9-11. Wing flap control system (U-8D, U-8G, RU-8D)

figure 9-11), wing flap actuators (6 and 8), wing flap motor and gear box assembly (14), flexible shafts (7 and 13), wing flap control switch (1), flap 20-degree position indicator (2), flap up position indicator (3), flap down position indicator (4), flap up limit switch (9), flap 20-degree limit switch (10), and flap down

limit switch (11). The wing flap control system is controlled by the wing flap control switch which activates the wing flap motor and gear box assembly.

a. Troubleshooting. For troubleshooting procedure for the wing flap control system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Wing flaps fail to retract or extend.	Circuit breaker tripped.	Reset circuit breaker.
	Bad electrical connection.	Check circuit continuity.
	Defective motor and gear box assembly.	Replace motor and gear box assembly. (Refer to paragraph 9-42.)
One flap position indicator inoperative.	Lamp burned out.	Replace lamp.
	Switch out of adjustment.	Readjust switch. (Refer to paragraph 9-39.)
All flap position indicators apparently inoperative (daylight).	Dimming resistor connected to circuit by having navigation lights ON.	Turn navigation lights OFF.
Wing flaps up and flap position indicator reads DOWN or wing flaps down and flap position indicator reads UP.	Wires improperly connected.	Repair or replace wiring.

b. Rigging. (1) Remove bolt, washers, and nut securing wing flap actuator (8, figure 9-11) to bracket on inboard wing flap (12) on right wing.

(2) Set flap up limit switch (9) to trip when inboard wing flap (12) reaches full up position as follows:

(a) Loosen screws securing flap up limit switch mounting bracket to bracket in right wing.

(b) Position mounting bracket so that flap up limit switch will trip when inboard wing flap (12) is moved to the full up position.

NOTE

There will be enough clearance between leading edge of inboard wing flap (12) and upper trailing edge of wing to pass a slip of paper. When rubber stop is installed in bracket, roller will rest firmly against the stop.

(c) Tighten screws securing flap up limit switch mounting bracket to right wing.

(3) Set flap down limit switch (11) to trip when inboard wing flap (12) on right wing reaches 30 ± 1 degree down position as follows:

(a) Loosen screws securing flap down limit switch mounting bracket to bracket in right wing.

(b) Using a level protractor to measure wing flap travel, set flap down limit switch (11) to trip when inboard wing flap (12) reaches 30 ± 1 degree down position.

NOTE

When using inboard flap travel board, place it on wings at station 57.438.

(c) Tighten screws securing flap down limit switch mounting bracket to bracket in right wing.

(4) Perform procedures outlined in step (2) above and set flap 20-degree limit switch (10) to trip, when inboard wing flap (12) reaches 20 ± 1 degree position.

(5) Position end of wing flap actuator (8) to bracket on inboard wing flap (12) and secure with bolt, washers, and nut.

(6) Move all wing flaps to full up position.

(7) Align remaining wing flaps with the inboard wing flap (12) by adjusting individual wing flap actuator to provide just enough clearance between wing flap and upper trailing edge of wing to pass a slip of paper as follows:

(a) Move wing flaps to full down position.

(b) Remove bolt, washers, and nut connecting end of each wing flap actuator to bracket on each wing flap.

(c) Adjust wing flap actuator by screwing end of wing flap actuator in or out as necessary, to align wing flap with inboard wing flap (12) on right wing.

(d) Position end of each wing flap actuator to bracket on each wing flap and install bolt, washers, and nut.

(e) Continue adjusting wing flap actuators until all wing flaps are aligned and flap position indicators read correctly.

(8) Check wing flaps for proper operation. Ensure that none of the rollers in the brackets in the wings bottom out before wing flaps are in full up position, that flap limit switches are

set correctly, and flap position indicators read correctly as to wing flap position.

9-59. WING FLAP ACTUATORS. (U-8D, U-8G, RU-8D)

9-60. The wing flap actuators (6 and 8, figure 9-11) operate the outboard and inboard wing flaps (5 and 12) in each wing. The wing flap actuators are operated by the wing flap motor and gear box assembly (14). The wing flap actuators are connected to the wing flap motor and gear box assembly by flexible shafts (7 and 13).

a. Removal. Remove each wing flap actuator (16, figure 9-2) as follows:

(1) Remove access covers above and below wing flap actuator (16) to be removed.

(2) Lower wing flaps and mark the extension of wing flap actuator (16) so that wing flap actuator can be installed without changing rigging of wing flaps.

(3) Remove bolts (10), washers (11 and 14), and nuts (15) and remove end of wing flap actuator (16) from bracket (13). Remove bushing (12) from end of wing flap actuator.

(4) Remove lock wire and disconnect flexible shaft from drive of wing flap actuator (16).

(5) Remove bolt (28) washers (29 and 31) and nut (32) from each wing flap actuator attachment point to wing structure.

(6) Remove wing flap actuator (16) from wing. Retain bushings (30) that are installed in actuator attachment points.

NOTE

Keep wing flap actuator in an upright position (driveup) and tape oil hole so that oil will not drain from actuator.

b. Cleaning. Clean wing flap actuators with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect wing flap actuators for bends, cracks, and corrosion.

(2) Screw actuator shafts in and out and check for internal binding.

d. Installation. (1) Position wing flap actuator (16) on bracket in wing and install bolt (28) washers (29 and 31) and nut (32).

NOTE

Bushings (30) are placed in actuator attachment bolt holes before placing actuator in position in wing. Install bolts (28) with nuts (32) inside next to actuator drive. Install thick washer (29) next to bolt head and a thin washer (31)

next to the nut. (See detail A, figure 9-2).

CAUTION

Make sure bolts (28) do not interfere with actuator movement up and down. Do not over tighten attachment bolts (28). Draw nut (32) and washers (20 and 31) up against bushing, then check to see that actuator moves up and down on attachment fittings without binding.

NOTE

Ensure that wing flap actuator is extended to mark made at time of removal, so that wing flap rigging will not be changed.

(2) Connect flexible shaft to drive flap actuator (16) and secure with lock wire.

(3) Position bushing (12) in end of wing flap actuator (16) and position end of wing flap actuator on bracket (13). Install washer (11) on bolt (10) and install bolt, washer (14), and nut (15).

CAUTION

Do not overtighten bolt thus causing a binding condition.

(4) Install access covers on wing above and below wing flap actuator (16) that was removed.

(5) Check rigging of wing flap system. (Refer to paragraph 9-57 or 9-65.)

9-61. WING FLAP MOTOR AND GEAR BOX ASSEMBLY. (U-8D, U-8G, RU-8D)

9-62. The wing flap motor and gear box assembly (14, figure 9-11) is located under the floorboard of the rear passenger seat in the U-8D and RU-8D. In the U-8G, the assembly is under floorboards of the forward passenger seats.

a. Removal. (1) Remove carpet, floorboards, and seats as required in accordance with Chapter 4, Section II.

(2) Disconnect electrical leads from flap motor.

(3) Remove lock wire and disconnect flexible shafts (7 and 13, figure 9-11) from both sides of flap gear box.

(4) Remove bolts and washers securing the wing flap motor and gear box assembly (14) to

rear spar and remove wing flap motor and gear box assembly.

(5) Remove screws and separate flap motor from flap gear box.

b. Cleaning. Clean flap gear box with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect flap gear box for cracks, dents, and corrosion.

d. Installation. (1) Position flap motor on flap gear box and secure with screws.

(2) Position wing flap motor and gear box assembly (14, figure 9-11) on rear spar and secure with bolts and washers.

(3) Connect electrical leads to flap motor.

(4) Connect flexible shafts (7 and 13) to both sides of flap gear box and secure with lock wire.

(5) Move wing flaps (5 and 12) through a complete cycle to check rigging. Ensure that no rollers (4, 6, 18, or 20, figure 9-2) bottom at either end of travel and that wing flaps are synchronized.

(6) Install carpet, floorboards, and seats in accordance with Chapter 4, Section II.

9-63. FLEXIBLE SHAFTS. (U-8D, U-8G, RU-8D)

9-64. There are two flexible shafts (7 and 13, figure 9-11) located in each wing of the U-8 aircraft. The flexible shafts are connected to the wing flap motor and gear box assembly (14) and routed through each wing to the wing flap actuators (6 and 8) in each wing.

a. Removal. (1) Remove carpet and floorboard

from rear of cabin to gain access to wing flap motor and gear box assembly (14, figure 9-11). (Refer to paragraphs 4-82 and 4-84; or 4-131 and 4-133; or 4-206 and 4-208.)

(2) Remove access covers beneath wing flap actuators (6 and 8) in each wing.

(3) Remove lock wire and jam nut, disconnect flexible shafts (7 and 13) from wing actuators (6 and 8) in each wing.

(4) Loosen set screw in each flap drive retainer, remove lock wire and jam nut, disconnect flexible shafts (7 and 13) from both sides of wing flap motor and gear box assembly (14). Slide flap drive retainer and jam nuts off end of flexible drive shafts.

(5) Remove attaching hardware securing clamps on flexible shafts (7 and 13) to structure in each wing and remove clamps.

(6) Remove flexible shafts (7 and 13) from each wing.

b. Cleaning. Clean flexible shafts with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect connectors on each end of flexible shafts for dents, cracks, and distorted threads.

(2) Inspect flexible shafts for dents, bends, and corrosion.

d. Installation. (1) Position flexible shafts (7, and 13, figure 9-11) in structure of each wing. Slip jam nut and flap retainers, (countersunk end toward gear box cover) over end of each flexible drive shaft.

(2) Connect flexible shafts (7 and 13) to wing flap actuators (6 and 8) in each wing and secure with lock wire.

(3) Connect flexible shafts (7 and 13) to both sides of wing flap motor and gear box assembly (14) tighten jam nut.

NOTE

Before positioning flap drive retainer remove play in flexible shafts (7 and 13) by exerting light pressure on shaft forcing shaft outboard. Release pressure and inspect each shaft keyway for full engagement into flap gear box assembly output shaft and a minimum of 0.010 inch clearance between shoulder of flap drive and gear box output shaft. Replace individual flap actuator drive shafts with like item where full keyway engagement cannot be obtained by adjustment of drive shaft housing.

(4) Secure jam nut with lock wire and position clamps on flexible shafts (7 and 13) and secure with attaching hardware.

(5) Slide flap drive retainer over gear box shaft until internal face of flap drive retainer bottoms on the end of the gear box shaft.

(6) Rotate flap drive retainer until the collar key slot is 90 degrees (plus or minus 10 degrees) to gearbox key slot.

(7) Install two flap drive retainer set screws and tighten securely.

(8) Install access covers on each wing.

(9) Install floorboard and carpet in rear of cabin. (Refer to paragraph 4-82 and 4-84, or 4-131 and 4-133, or 4-206 and 4-208).

9-65. WING FLAP CONTROL SYSTEM (U-8F)

9-66. the wing flap control system consists of outboard and inboard wing flaps (5 and 7, figure 9-12), wing flap actuators (6 and 8), wing flap motor and gear box assembly (12), flexible shafts (3 and 4), wing flap control switch (1), flap

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Wing flaps fail to operate	Circuit breaker tripped.	Reset circuit breaker.
	Defective wing flap motor and gear box assembly.	Replace wing flap motor and gear box assembly. (Refer to paragraph 9-61.
	Improper electrical connections.	Repair or replace wiring.
Flap position indicator inoperative.	Improper electrical connections.	Repair or replace wiring.
Flap position indicator registers incorrectly.	Flap position transmitter out of adjustment.	Adjust flap position transmitter as described in paragraph 9-65.

position indicator (2), flap up limit switch (9), flap position transmitter (10), and flap down limit switch (11). The wing flap control system is controlled by the wing flap control switch which activates the wing flap motor and gear box assembly.

a. Troubleshooting. For troubleshooting procedures for the wing flap control system, proceed as follows: (See page 9-33.)

b. Rigging. (1) Remove bolt, washer, and nut securing wing flap actuator (8, figure 9-12) to bracket on inboard wing flap (7) on right wing.

(2) Set flap up limit switch (9) to trip when inboard wing flap (7) reaches full up position as follows:

(a) Loosen screw securing flap up limit switch mounting bracket to bracket in right wing.

(b) Position flap up limit switch mounting bracket to trip when inboard wing flap (7) is moved to the full up position.

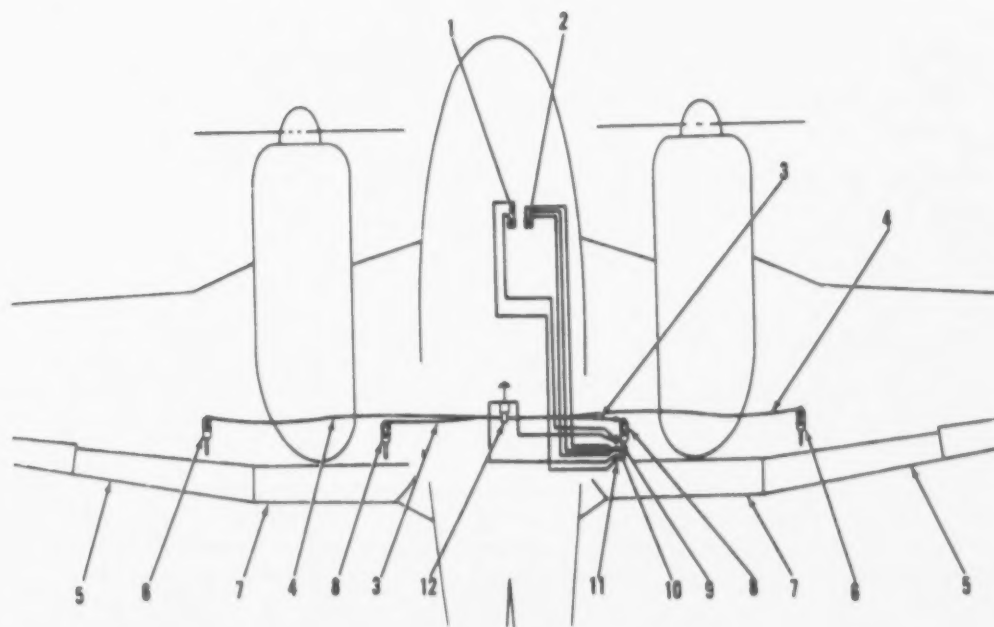
NOTE

When inboard wing flap (7) is all the way up, the roller in the track of bracket in wing will rest firmly against rubber stop in track of bracket. There will be enough clearance between leading edge of inboard wing flap and upper trailing edge of wing to pass a slip of paper.

(c) Tighten screws securing flap up limit switch mounting bracket to bracket in right wing.

(3) Set flap down limit switch (11) to trip when inboard wing flap (7) on right wing reaches 30 ± 1 degree down position as follows:

(a) Loosen screw securing flap down limit switch mounting bracket to bracket in right wing.



- | | | | |
|-----------------------------|-----------------------|-------------------------|---|
| 1. Wing flap control switch | 4. Flexible shaft | 7. Inboard wing flap | 10. Flap position transmitter |
| 2. Flap position indicator | 5. Outboard wing flap | 8. Wing flap actuator | 11. Flap down limit switch |
| 3. Flexible shaft | 6. Wing flap actuator | 9. Flap up limit switch | 12. Wing flap motor and gear box assembly |

Figure 9-12. Wing flap control system (U-8F)

(b) Using a bevel protractor or an inboard flap travel board, Part No. 50-590092, FSN 5220-545-6079, to measure wing flap travel, set flap down limit switch (11) to trip when inboard wing flap (7) reaches 30 ± 1 degree down position.

NOTE

When using inboard flap travel board place it on wing at station 57.438.

(c) Tighten screw securing flap down limit switch mounting bracket to bracket in right wing.

(4) Position end of wing flap actuator (8) to bracket on inboard wing flap (7) on right wing and secure with bolt, washers, and nut.

(5) Move all wing flaps to full up position.

(6) Align remaining wing flaps with inboard wing flap (7) by adjusting individual wing flap actuator to provide just enough clearance between wing flap and upper trailing edge of wing to pass a slip of paper as follows:

(a) Move wing flaps to full down position.

(b) Remove bolt, washer, and nut connecting end of wing flap actuator to bracket on wing flap.

(c) Adjust wing flap actuator by screwing end of wing flap actuator in or out, as necessary, to align wing flaps with inboard wing flap (7) on right wing.

(d) Position end of wing flap actuator to bracket on wing flap and install bolt, washer.

and nut.

(e) Continue adjusting wing flap actuators until all wing flaps are aligned and flap position indicator reads correctly.

(7) Adjust flap position transmitter (10) as follows:

(a) Move wing flaps to full down position and check reading on flap position indicator (2). If flap position indicator reading is not 100 percent flaps, loosen bolt in arm of flap position transmitter (10) and rotate transmitter shaft until reading is correct, then tighten bolt in arm of flap position transmitter.

(b) Move wing flaps to full up position and check for 0 percent reading on flap position indicator (2). If flap position indicator reading is not correct, lower wing flaps and lengthen fork of flap position transmitter if reading is greater than 0 percent, or shorten if reading is less than 0 percent, to correct approximately one-half of flap position indicator reading.

(8) Check wing flaps for proper operation. Ensure that none of the rollers bottom out in track of brackets in wings before wing flaps reach full up position, and that flap up and down limit switches are set correctly.

9-67. WING FLAP ACTUATORS.(U-8F).

9-68. Maintenance instructions for the wing flap actuators (6 and 8, figure 9-12) are the same as for U-8D, U-8G, and RU-8D aircraft. (Refer to paragraph 9-59.)

9-69. WING FLAP MOTOR AND GEAR BOX ASSEMBLY.(U-8F)

9-70. Maintenance instructions for the wing flap motor and gear box assembly (12, figure 9-12) are the same as for U-8D, U-8G, and RU-8D aircraft. (Refer to paragraph 9-61.)

9-71. FLEXIBLE SHAFTS.(U-8F)

9-72. Maintenance instructions for the flexible shafts (3 and 4, figure 9-12) are the same as for U-8D, U-8G, and RU-8D aircraft. (Refer to paragraph 9-63.)

9-73. ELEVATOR CONTROL SYSTEM.(U-8D, U-8G, RU-8D)

9-74. The elevator control system consists of elevators (5 and 8, figure 9-13), control cable

(12), pulleys (1, 2, 3, 4, 13, 14, and 15), bellcrank (6), spring (10), and control rods (9). The control cable is attached to the push-pull tube of the control column assembly behind the instrument panel. Rig the elevator control system as follows:

a. Remove tail cone. (Refer to paragraph 4-228.)

b. Remove access covers located on fuselage below horizontal stabilizer.

c. Remove lock wire from turnbuckles (11, figure 9-13) and loosen turnbuckles to relieve tension on control cables (12).

d. Set bellcrank (6) in neutral position (arms vertical) and install rigging pin.

NOTE

Rigging pin may be any rod or bolt 3/16-inch in diameter and 3 inches long.

e. Position control column assembly 4 inches aft of forward stop and secure in position by placing a C-clamp around control column assembly.

CAUTION

Tighten C-clamp just enough to secure control column assembly in this position.

f. Adjust control cable (12) in accordance with paragraph 9-123.

g. Position a protractor or elevator travel board on horizontal stabilizer at station 49.625 and check elevators for neutral position.

h. Adjust control rods (9), if required, to place elevators in neutral position as follows:

(1) Remove nut and washer and remove aft end of spring (10) from bolt securing forward ends of control rods (9) to bellcrank (6). Remove bolt.

(2) Remove bolts, washers, and nuts securing aft ends of control rods (9) to elevator horn.

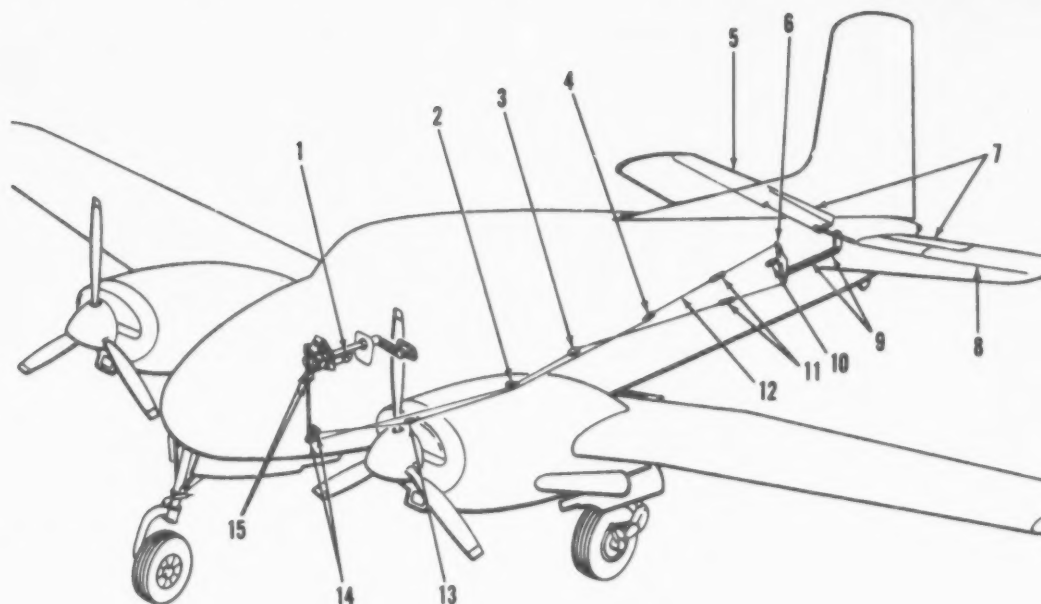
(3) Loosen nuts securing rod end in position and screw rod end out or in to lengthen or shorten control rods (9).

(4) Tighten nuts to secure rod ends in position.

(5) Position aft ends of control rods (9) on elevator horn and install bolts, washers, and nuts.

(6) Position forward ends of control rods (9) on bellcrank (6) and install bolt. Hook aft end of spring (10) on bolt and secure with washer and nut.

i. Remove rigging pin from bellcrank (6) and



- | | | |
|-------------|-----------------------|-------------------|
| 1. Pulley | 6. Bellcrank | 11. Turnbuckles |
| 2. Pulley | 7. Elevator trim tabs | 12. Control cable |
| 3. Pulley | 8. Elevator | 13. Pulley |
| 4. Pulley | 9. Control rods | 14. Pulleys |
| 5. Elevator | 10. Spring | 15. Pulleys |

Figure 9-13. Elevator control system (U-8D, U-8G, RU-8D)

C-clamp from control column assembly.

j. Check elevators for travel as specified in table 9-1. Adjust bellcrank stops as necessary to obtain travel limits. Adjust fore (down) control column stop 1/8-inch from bumper with control against primary down stop. Lock stop with jam nut, adjust aft (up) control column stop 1/8-inch from bumper with control against primary up stop. Lock stop with jam nut.

k. Check control column assembly stop for 1/8-inch clearance when bellcrank stops have contacted bellcrank (6).

l. Check force required to bring control column assembly within 1/8-inch of control column assembly stop, with a spring scale. Force required should be 30 ± 0-3 pounds.

NOTE

If a greater force is required, check elevator control system for excessive frictions, such as a frozen pulley or binding linkage. If less force is required, replace spring (10). (Refer to paragraph 9-77.)

m. Install access covers on fuselage below horizontal stabilizers.

n. Install tail cone. (Refer to paragraph 4-288.)

9-75. CONTROL CABLE (U-8D, U-8G, RU-8D)

9-76. The control cable (12, figure 9-13) for the elevator control system is connected to the lower

end of bellcrank (6) and routed around pulleys in the fuselage and pulley (1) located forward of the instrument panel, then aft around pulleys in the fuselage to the upper end of the bellcrank. The control cable is attached to the push-pull tube of the control column assembly just forward of pulley (1).

a. Removal. (1) Remove seats, carpet, and floorboard to gain access to pulleys (1, 2, 3, 13, 14, and 15, figure 9-11). (Refer to paragraphs 4-56 or 4-113; 4-82 or 4-131; and 4-84 or 4-133.)

(2) Remove access cover in aft baggage compartment to gain access to pulley (4).

(3) Remove access cover on aft fuselage just below horizontal stabilizers to gain access to bellcrank (6).

(4) Remove lock wire from turnbuckles (11) and loosen turnbuckles.

(5) Remove cotter pins, bolts, washers, and nuts and remove ends of control cable (12) from bellcrank (6).

(6) Remove turnbuckles (11) from control cable (12) and connect lead lines to ends of control cable.

(7) Remove cable-retaining pins from brackets at pulleys (1, 2, 3, 4, 13, 14, and 15).

(8) Disconnect control cable (12) from push-pull tube of control column assembly.

(9) Pull control cable (12) from fuselage structure and disconnect lead lines. Connect lead line to push-pull tube of control column assembly.

(10) Remove bolts, washers, and nuts and remove pulleys (1, 2, 3, 4, 13, 14, and 15) from brackets.

b. Cleaning. Clean control cables with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion. Inspect corroded cables for internal corrosion per TM 55-1500-204-25/1.

(1A) Replace control cables when following conditions exists:

(a) Six or more broken wires per inch in 1/8-inch cable.

(b) Three or more broken wires per inch in 3/32-inch cable.

(c) Any cable with broken wires if aircraft is to be placed on extended operation in area where replacement cables are not available.

(2) Inspect pulleys for cracks, dents, corrosion, and evidence of misalignment.

(3) Inspect brackets of pulleys for cracks, bends, corrosion, misalignment, and security of attachment.

d. Installation. (1) Position pulleys (1, 2, 3, 4, 13, 14, and 15, figure 9-13) on brackets and install bolts, washers, and nuts.

(2) Coat control cable (12) with lubricating oil (item 63, table 1-8) before installing.

(3) Disconnect lead lines from push-pull tube of control column assembly and connect to ends of control cable (12).

(4) Pull on lead lines at bellcrank (6) and pull control cable (12) into position. Disconnect lead lines.

(5) Install turnbuckles (11) on end of control cable (12).

(6) Position ends of control cable (12) on bellcrank (6) and secure with bolts, washers, nuts, and cotter pins.

(7) Adjust control cable (12) in accordance with paragraph 9-123. Secure turnbuckles (11) with lock wire.

(8) Install access covers in aft baggage compartment and on fuselage just below horizontal stabilizers.

(9) Install floorboard, carpet, and seats. (Refer to paragraphs 4-56 or 4-113; 4-82 or 4-131; and 4-84 or 4-133.)

9-77. BELLCRANK AND CONTROL RODS. (U-8D, U-8G, RU-8D)

9-78. The bellcrank (6, figure 9-13) and control rods (9) are located in the tail section of the fuselage. The ends of control cable (11) are attached to the upper and lower ends of the bellcrank. The bellcrank has a spring connected to a bracket on the forward side of the bellcrank along with the control rods. The spring improves the flight and ground handling characteristics of the aircraft by providing a constant elevator control force.

a. Removal. (1) Remove tail cone. (Refer to paragraph 4-228.)

(2) Remove access covers located on fuselage just below horizontal stabilizer.

(3) Remove lock wire from turnbuckles (11, figure 9-13) and loosen turnbuckles.

(4) Remove bolt, washers, and nut connecting control rods (9) and spring to bellcrank (6).

(5) Remove bolt, washer, and nut connecting spring to bracket in fuselage and remove spring.

(6) Remove bolts, washers, and nuts connecting control rods (9) to elevator horn and remove control rods.

(7) Remove cotter pins, bolts, washers, and nuts connecting ends of control cable (12) to bellcrank (6).

(8) Remove bolts, washers, and nuts securing bellcrank (6) on support bracket and remove

bellcrank.

b. Cleaning. Clean bellcrank, control rod, and spring with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. (1) Inspect bellcrank for cracks, dents, bends, corrosion, and elongated bolt holes.

(2) Inspect control rods for cracks, dents, bends, and corrosion, and rod end bearings for free and easy movement.

(3) Inspect spring for bends and corrosion.

d. Installation. (1) Position bellcrank (6, figure 9-13) on support bracket in fuselage and secure with bolt, washer, and nut.

(2) Position ends of control rods (9) on bellcrank and install bolt. Hook aft end of spring on bolt and install washer and nut.

(3) Position forward end of spring on bracket in fuselage and install bolt, washer, and nut.

(4) Position aft end of control rods (9) on elevator horn and install bolts, washers, and nuts.

(5) Position ends of control cable (12) on upper and lower ends of bellcrank (6) and install bolts, washers, nuts, and cotter pins.

(6) Rig elevator control system in accordance with paragraph 9-73. Ensure that all turnbuckles are secured with lock wire.

(7) Install access covers on fuselage just below horizontal stabilizers.

(8) Install tail cone. (Refer to paragraph 4-228.)

9-79. ELEVATOR CONTROL SYSTEM. (U-8F)

9-80. The elevator control system consists of elevators (3 and 6, figure 9-14) rear bellcrank (4), forward bellcrank (14), control cables (8 and 11), pulleys (1, 2, 12, and 13) and control rods (7 and 15). Two springs are attached to arms on the support tube of the rear bellcrank and connected to brackets located aft of the rear bellcrank. Rig the elevator control system as follows:

a. Remove pilot's seat, carpet, and floor web from flight compartment. (Refer to paragraphs 4-159, 4-175, and 4-177.)

b. Remove tail section access panel from baggage compartment.

c. Remove tail cone. (Refer to paragraph 4-228.)

d. Remove lock wire from turnbuckles (10, figure 9-14) and loosen turnbuckles to relieve tension on control cables (8 and 11).

e. Install rigging pin in rear and forward bellcranks (4 and 14).

NOTE

Rigging pin may be any bolt or rod 3/16-inch in diameter and 3 inches long.

f. Adjust control rods (7) to position elevators (3 and 6) in neutral position as follows:

(1) Remove bolts, washers, and nuts attaching ends of control rods (7) to lower arms on support tube of rear bellcrank (4) and elevator horns (5). Remove control rods.

(2) Loosen nut on each end of each control rod (7) and screw each rod end out or in to lengthen or shorten control rod.

(3) Tighten each nut to secure rod end in position.

(4) Position ends of control rods (7) on arms on support tube for rear bellcrank (4) and elevator horns (5). Secure in position with bolts, washers, and nuts.

CAUTION

Ensure that threads on rod ends are visible through inspection hole at each end of control rod (7).

g. Adjust control cables (8 and 11) in accordance with paragraph 9-123. Apply tension equally to each control cable to maintain neutral position of elevators (3 and 6).

h. Remove rigging pins from rear and forward bellcranks (4 and 14).

i. Adjust elevator stops located on elevator horns (5) to obtain limits of travel of elevators (3 and 6) as specified in table 9-1. Use a protractor or elevator travel board to measure elevator travel.

j. Adjust forward bellcrank stops located on forward bellcrank (14) for 1/8-inch clearance when elevator stops have reached their full travel.

k. Adjust control rod (15) to obtain a clearance of 4.25 ± 0.25 inches between forward flange of control wheels and aft ends of support assemblies for control column assembly located on subpanel, with elevators (3 and 6) resting on down stops.

CAUTION

Ensure that threads on rod end are visible through inspection hole in end of control rod. Ensure that control column assembly clears all wire bundles on subpanel and forward bulkhead.

1. Check tension of springs connected to arms on support tube of rear bellcrank (4) as follows:

(1) Ensure that elevators (3 and 6) are resting on down stops.

(2) Attach a spring scale to control wheel so that line of pull will be centered on control wheel.

(3) Pull aft on spring scale until elevators (3 and 6) start to move off of down stops. A force of 25 to 30 pounds is required to do this.

(4) If force is greater than 25 to 30 pounds, check for a frozen or binding pulley or binding control cables.

(5) If force is less than 25 to 30 pounds, replace springs. (Refer to paragraph 9-81.)

m. Secure turnbuckles (10) with lock wire.

n. Make a visual check. Ensure that elevators (3 and 6) movement corresponds to movement of control column assembly.

o. Install access panel in baggage compartment.

p. Install tail cone. (Refer to paragraph 4-228.)

q. Install floor web, carpet, and pilots seat. (Refer to paragraphs 4-159, 4-175, and 4-177.)

9-81. REAR BELLCRANK AND CONTROL RODS (U-8F)

9-82. The rear bellcrank (4, figure 9-13) and control rods (7) are located in the tail section of the fuselage. The ends of control cables (8) are connected to the lower and upper ends of the rear bellcrank. A spring is connected to each upper arm on the support tube for the bellcrank. The springs improve the flight and ground handling characteristics of the aircraft by providing a constant elevator control force. The control rods are connected to arms on the lower side of the support tube for the rear bellcrank and connected to the elevator horns (5).

a. Removal. (1) Remove tail cone (refer to paragraph 4-228).

(2) Remove access panel for tail section located in baggage compartment and access covers on each side of fuselage just below horizontal stabilizers.

(3) Secure the elevator cables to the fuselage structure, using "C" clamps and blocks, to prevent slippage. Remove lock wire from turnbuckles (10, figure 9-14) and loosen turnbuckles to relieve tension on control cables (8 & 11).

(4) Remove cotter pins, bolts, washers, and nuts connecting ends of control cables (8) to rear bellcrank (4).

(5) Remove cotter pins, bolts, washers, and nuts securing forward end of springs on upper arms of support tube for rear bellcrank (4).

(6) Remove bolts, washers, and nuts securing aft end of springs to bracket on rear fuselage bulkhead and remove springs.

(7) Remove bolts, washers, and nuts connecting control rods (7) to lower arms on support tube for rear bellcrank (4) and elevator horns (5). Remove control rods.

(8) Remove bolts, washers, and nuts and remove rear bellcrank (4) from tail section of fuselage.

(9) Disassemble the bellcrank as necessary to replace cracked, worn, and damaged components.

CAUTION

Do not spin rod end bearings with compressed air.

b. Cleaning. (1) Clean rear bellcrank and control rods with solvent (item 95, table 1-8) and dry with filtered compressed air.

c. Inspection (Bellcrank and Control Rods). (1) Visually inspect the torque tubes, bellcrank and arms for cracking, corrosion, and damage. Penetrant inspect in accordance with TMN3-0103.

(2) Inspect for loose taper pins.

(3) Inspect control rod for cracks, bends, and corrosion as follows:

(a) Measure the length of the tube assembly and record this information for reassembly, then remove the rod ends from the control rod.

(b) Remove lubricant from the threads on the rod and rod ends.

(c) Visually inspect the inside surface of the control rod to verify that the interior has been treated with corrosion preventative compound and is not pitted. Widely dispersed surface corrosion is acceptable. Treated tubes will have a dull, tacky finish on the interior.

(d) Visually inspect the exterior of the control rods for corrosion, pitting, nicks, and scratches.

(e) Inspect for bows in the control rod by laying a straight edge (the straight edge must be at least as long as the tube) against the tube, moving it around the circumference of the tube and checking with a feeler gage between the tube and the straight edge. Control rod will be replaced if bow exceeds 0.060 inch.

(f) Inspect rod end bearings for free and easy movement. Excessively loose rod end bearings will be replaced.

(g) Penetrant inspect the tube, especially the threaded ends of the tube, in accordance with TM43-0103.

d. Repair or replacement. 1. Control Rod Repair.

(a) Blend out pits, minor nicks and scratches, (less than 0.010 inch deep) with cloth, abrasive aluminum oxide (item 93, table 1-8) then clean with naphtha (item 16, table 1-8) and prime with zinc chromate primer (item 35, table 1-8).

(b) Replace worn rod end bearings, corroded and/or bent push rods, reference paragraph for assembly instructions.

(c) If for any reason a control rod assembly needs internal treatment with corrosion preventative compound, form a funnel from 0.016 inch thick aluminum sheet or equivalent. Fill the control rod with corrosion preventative compound (item 30, table 1-8), dilated with naphtha (item 16, table 1-8) sufficiently to allow the mixture to flow through the tube. Pour diluted corrosion preventative compound through the control rod and drain off excess solution.

(2) Elevator Rear Bellcrank Repair NOTE

If any component of the bellcrank assembly is cracked, no repair is permitted. Assembly will be replaced.

(a) If bellcranks or torque tubes are pitted, nicked, scratched, etc., proceed as follows:

(1) Blend out pits, minor nicks, and scratches (less than 0.010 inch) with cloth abrasive aluminum oxide (item 93, table 1-8).

(2) Locally treat in accordance with TM 43-0105.

(3) Prime with epoxy (item 94, table 1-8).

(b) If, taper pins and bellcranks are loose on torque tube, proceed as follows:

CAUTION

To avoid damaging the torque tube or bellcrank castings, do not drive the taper pins or overtorque them. Taper pins may be set using a light nylon or rawhide mallet. Torque taper pin nuts 30 to 35 inch pounds.

(1) Remove the nut and washer, then inspect the small end of the tapered shank (behind threads) to ensure tapered shank is flush with, or extends no more than 0.060 inch through the bellcrank.

(2) If the small end of the tapered shank does not extend through the bellcrank, remove the pin. Then ream the hole with a number 3 "B & S" (1/4 inch per foot) taper hand reamer, type XIV per federal specification GGG-R-180, to obtain a proper fit as specified in paragraph 2a.

(3) If the pin extends too far through the bellcrank (beyond 0.060 inch), the taper pin is worn or the hole is too large. If the taper pin is worn as determined by visual inspection, install a new pin of the same size and recheck for proper extension.

CAUTION

If the center of the tapered pin hole can not reasonably be determined, replace the entire bellcrank assembly.

(4) If the hole in the bellcrank is too large the hole must be reamed out at too large the hole must be reamed out as required for installation of the next larger size taper pin. Ream the hole with number 4 "B & S", type XIV hand reamer per federal specification GGG-R-180. Replace the assembly if maximum limit is exceeded.

e. Assembly, elevator aft control rods.

CAUTION

Be certain that the threads on the rod ends are visible in the inspection holes in the ends of the tubes.

(1) Lubricate the threads on both ends with corrosion preventive compound (item 30, table 1-8), and install rod end bearings and tighten the jam nuts. Ensure that the tube assembly is the same lengths previously recorded. TORQUE THE JAM NUTS TO 25-30 INCH POUNDS.

(2) If not previously accomplished, paint a band approximately 1/4 inch wide around the control rod (near center) using black paint (item 96, table 1-8).

f. Installation. (1) Position rear bellcrank (4, figure 9-14) in tail section of fuselage and secure with bolts, washers, and nuts.

(2) Position aft ends of control cables (8) on upper and lower ends of rear bellcrank (4) and secure with bolts, washers, nuts, and cotter pins.

(3) Position forward ends of control rods (7) on lower arms on support tube for rear bellcrank (4) and secure with bolts, washers, and nuts.

(4) Position aft ends of control rods (7) on elevator horns (5) and secure with bolts, washers, and nuts.

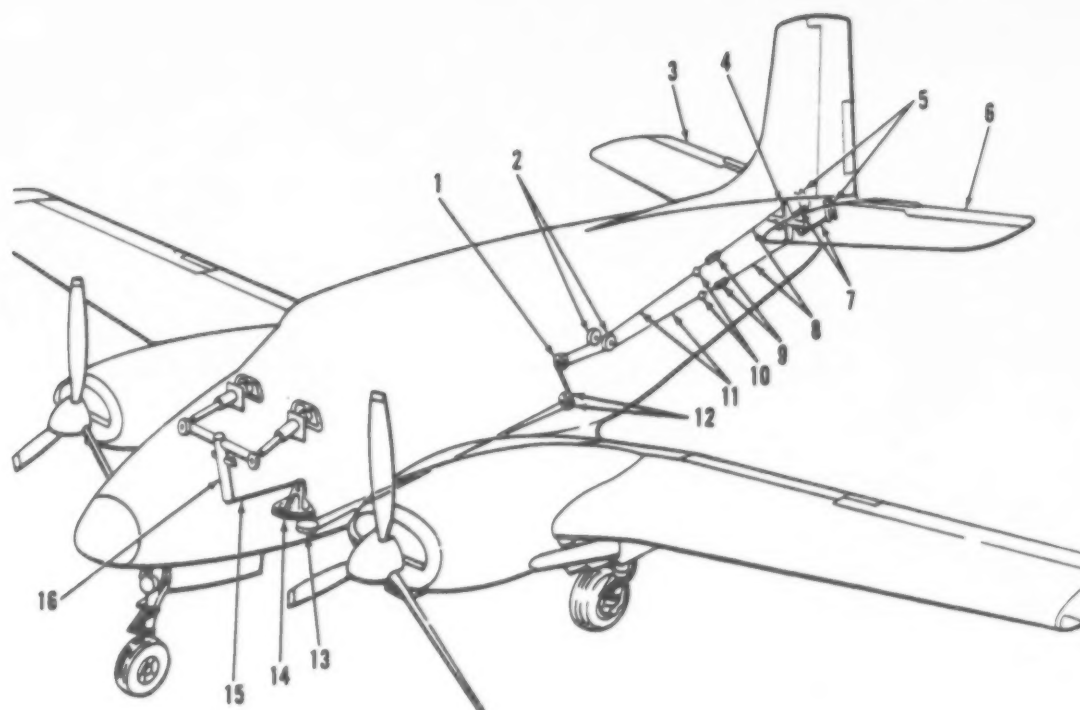
(5) Position aft ends of springs on bracket on rear fuselage bulkhead and secure with bolts, washers, and nuts.

(6) Position forward ends of springs on upper arms on support tube for rear bellcrank (4) and secure with bolts, washers, nuts, and cotter pins.

(7) Rig elevator control system in accordance with paragraph 9-79. Secure turnbuckles (10) with lock wire.

(8) Install access panel in baggage compartment and access covers on fuselage below horizontal stabilizers.

(9) Install tail cone. (Refer to paragraph 4-228.)



- | | | | |
|-------------------|-------------------|--------------------|-----------------------|
| 1. Pulley | 5. Elevator horns | 9. Cable stops | 13. Pulley |
| 2. Pulleys | 6. Elevator | 10. Turnbuckles | 14. Forward bellcrank |
| 3. Elevator | 7. Control rods | 11. Control cables | 15. Control rod |
| 4. Rear bellcrank | 8. Control cables | 12. Pulleys | 16. Tee weld assembly |

Figure 9-14. Elevator control system (U-8F)

9-83. FORWARD BELLCRANK AND CONTROL ROD (U-8F)

9-84. The forward bellcrank (14, figure 9-14) and control rod (15) are located under the floorboard of the pilot's compartment. Control cables (11) are connected to the outboard end of the forward bellcrank, and control rod (15) is connected to the inboard end. The forward end of the control rod is connected to a fitting on the lower end of tee weld assembly (16) of the control column assembly.

a. Removal. (1) Remove access panel just aft of nose wheel well on bottom of fuselage.

(2) Remove pilot's seat, carpet, and floor web from flight compartment. (Refer to paragraphs 4-159, 4-175, and 4-177.)

(3) Remove lock wire from turnbuckles (10, figure 9-14) and loosen turnbuckles to relieve tension from control cables (11).

(4) Remove bolt, washer, and nut connecting forward end of control rod (15) to fitting on lower end of tee weld assembly (16) and aft end on forward bellcrank (14). Remove control rod.

(5) Remove screw connecting ends of control cables (11) to forward bellcrank (14). Tag end of each control cable to aid in reconnecting in proper position on forward bellcrank.

(6) Remove bolt, washer, and nut and remove forward bellcrank (14) from support bracket.

b. Cleaning. Clean forward bellcrank and control rod with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin rod end bearings with compressed air.

c. Inspection. (1) Inspect forward bellcrank for cracks, bends, and corrosion.

(2) Inspect bellcrank bearings for free and easy movement, and bushings for cracks and galling.

(3) Inspect control rod for cracks, bends, and corrosion, and rod end bearings for free and easy movement.

d. Installation. (1) Position forward bellcrank (14, figure 9-14) on support bracket and install bolt, washer, and nut.

(2) Remove tags from ends of control cables (11). Position ends of control cables on forward bellcrank (14) and secure with screw.

(3) Position forward end of control rod (15) on fitting on lower end of tee weld assembly (16) and aft end on forward bellcrank (14). Install bolts, washers, and nuts.

(4) Rig elevator control system in accordance with paragraph 9-79. Ensure that turnbuckles (10) are secured with lock wire.

(5) Install access panel on bottom of fuselage just aft of nose wheel well.

(6) Install floor web, carpet, and pilot's seat in flight compartment. (Refer to paragraphs 4-159, 4-175, and 4-177.)

9-85. CONTROL CABLES. (U-8F)

9-86. The control cables for the elevator control system consist of two control cables (8, figure 9-14) and two control cables (11). Control cables (8) are connected to the upper and lower ends of the rear bellcrank (4) and routed forward in the tail section to turnbuckles (10). Control cables (11) are connected to the forward bellcrank (14) and routed aft around pulleys in the fuselage to turnbuckles (10) in the tail section.

a. Removal. (1) Remove necessary seats, carpeting, and floor web to gain access to forward bellcrank (14, figure 9-14), pulleys (1, 2, and 12), and rear bellcrank (4). (Refer to paragraphs 4-159, 4-175, and 4-177.)

(2) Remove access panel in baggage compartment to gain access to turnbuckles (10).

(3) Remove access covers on fuselage of tail section just below horizontal stabilizers to gain access to rear bellcrank (4).

(4) Remove lock wire from turnbuckles (10); relieve tension on control cables (8 and 11).

(5) Tag ends of control cables (11) as to point of attachment to forward bellcrank (14) and ends of control cables (8) as to point of attachment on rear bellcrank (4).

(6) Remove screw attaching ends of control cables (11) to forward bellcrank (14) and connect lead lines to ends of control cables.

(7) Remove cable-retaining pins from brackets at pulleys (1, 2, 12, and 13).

(8) Remove cotter pins, bolts, washers, and nuts connecting aft ends of control cables (8) to upper and lower ends of rear bellcrank (4).

(9) Pull control cables (8 and 11) from fuselage and disconnect lead lines. Connect lead lines to proper end of rear bellcrank (4).

(10) Disconnect control cables (8) from control cables (11) by removing turnbuckles (10).

(11) Remove bolts, washers, and nuts and remove pulleys (1, 2, 12, and 13) from brackets.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin pulleys with compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion.

NOTE

Replace control cables that are corroded or have six or more broken wires per inch. Replace control cables that have any broken wires if aircraft is to be placed on extended operation in area where replacement cables are not available.

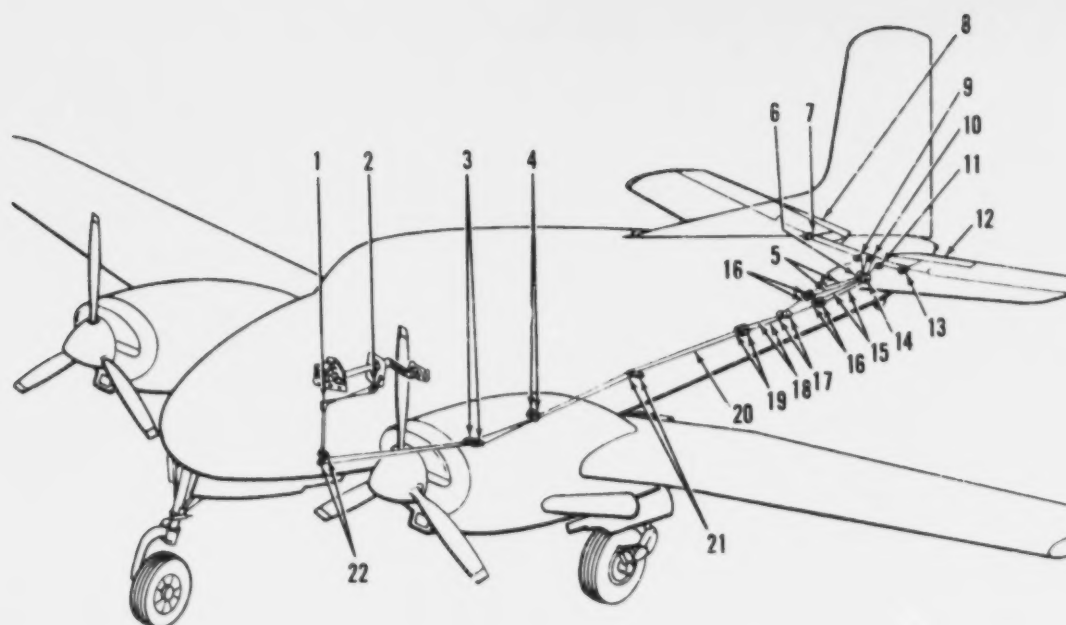
(2) Inspect pulleys for cracks, dents, bends, corrosion, and evidence of misalignment.

(3) Inspect brackets of pulleys for cracks, bends, corrosion, and misalignment.

d. Installation. (1) Connect ends of control cables (8 and 11, figure 9-14) together with turnbuckles (10).

(2) Disconnect ends of lead lines from upper and lower ends of rear bellcrank (4) and connect to forward ends of control cables (11).

(3) Position pulleys (1, 2, 12, and 13) on brackets and install bolts, washer, and nuts.



- | | | |
|--|--------------------------------|--------------------|
| 1. Pulley | 9. Pulley | 17. Pulleys |
| 2. Control and position indicator assembly | 10. Pulley | 18. Control cables |
| 3. Pulleys | 11. Pulley | 19. Turnbuckles |
| 4. Pulleys | 12. Elevator trim tab | 20. Control cable |
| 5. Control cables | 13. Elevator trim tab actuator | 21. Pulleys |
| 6. Pulley | 14. Pulley | 22. Pulleys |
| 7. Elevator trim tab actuator | 15. Control cables | |
| 8. Elevator trim tab | 16. Turnbuckles | |

Figure 9-15. Elevator trim tab control system (U-8D, U-8G, RU-8D)

stabilizers. Remove trim tab actuators and control cables (5 and 15, figure 9-15, or 3 and 13, figure 9-16) from horizontal stabilizers. Disconnect lead lines from control cables.

(8) Remove bolts, washers, and nuts and remove brackets from elevator trim tab actuator housings.

(9) Remove cable drums from elevator trim tab actuator housing with control cables installed.

(10) Remove cable pins from cable drums and remove control cables (5 and 15, figure 9-15, or 3 and 13, figure 9-16) from cable drums.

b. Cleaning. Clean elevator trim tab actuators with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect elevator trim tab actuators for cracks, dents, bends, and corrosion.

d. Installation. (1) Position exact center of control cables (5 and 15, figure 9-15, or 3 and

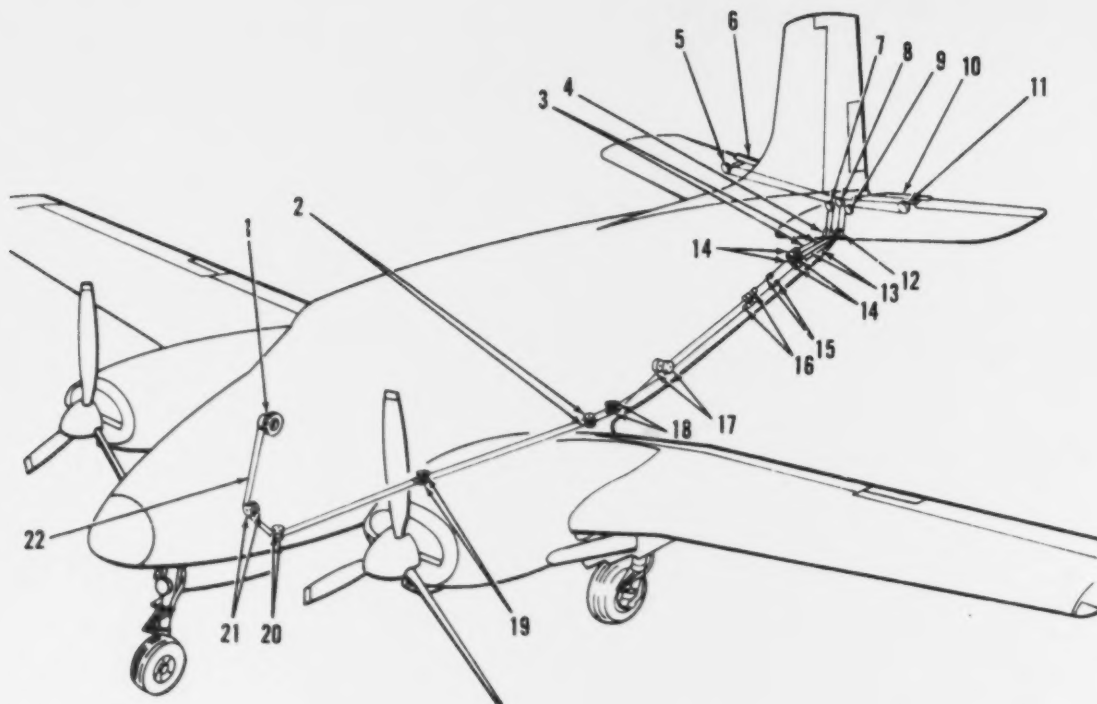
13, figure 9-16) on cable drums and install cable pins. Wind ends of control cables in opposite directions around cable drums 2-1/2 turns.

(2) Position cable drum with control cable into each elevator trim tab actuator housing. Position brackets on elevator trim tab actuator housings and install bolts, washers, and nuts.

(3) Connect lead lines to ends of control cables (5 and 15, figure 9-15, or 3 and 13, figure 9-16). Pull control cables into position on pulleys (6, 9, 10, 11, and 14, figure 9-15, or 4, 7, 8, 9, and 12, figure 9-16) and install cable-retaining pins in brackets at pulleys.

(4) Position elevator trim tab actuators (7 and 13, figure 9-15, or 5 and 11, figure 9-16) on rear spars of horizontal stabilizers and secure with screw.

(5) Disconnect lead lines from ends of control cables (5 and 15, figure 9-15, or 3 and 13,



- | | | | |
|---|--------------------------------|--------------------|-------------------|
| 1. Control and position indicator assembly. | 7. Pulley | 13. Control cables | 19. Pulleys |
| 2. Pulleys | 8. Pulley | 14. Turnbuckles | 20. Pulleys |
| 3. Control cables | 9. Pulley | 15. Control cables | 21. Pulleys |
| 4. Pulley | 10. Elevator trim tab | 16. Turnbuckles | 22. Control cable |
| 5. Elevator trim tab actuator | 11. Elevator trim tab actuator | 17. Pulleys | |
| 6. Elevator trim tab | 12. Pulley | 18. Pulleys | |

Figure 9-16. Elevator trim tab control system (U-8F)

figure 9-16). Connect control cables to turnbuckles (16, figure 9-15, or 14, figure 9-16).

(6) Position forward ends of control rods to aft ends of elevator trim tab actuators (7 and 13, figure 9-15, or 5 and 11, figure 9-16). Install bolts, nuts, and cotter pins.

(7) Rig elevator trim tab control system in accordance with paragraph 9-87. Secure turnbuckles (16, figure 9-15, or 14, figure 9-16) with lock wire.

(8) Install access covers on fuselage below horizontal stabilizers and underside of horizontal stabilizers.

(9) Install tail cone. (Refer to paragraph 4-228.)

9-91. CONTROL AND POSITION INDICATOR ASSEMBLY. (U-8D, U-8G, RU-8D)

9-92. The control and position indicator assembly (2, figure 9-15) is located on the console in the flight compartment.

a. Removal. (1) Remove access cover from fuselage just below horizontal stabilizers.

(2) Remove lock wire and loosen turnbuckles (19, figure 9-15).

(3) Remove screws securing shield for control wheel to console in flight compartment and remove shield.

(4) Remove edge light panel from left and right subpanels.

(5) Remove retaining ring and pin and remove knob for aileron trim tab control system.

(6) Remove screws securing hanger fitting for control column assembly to console. Slide hanger fitting aft on control column assembly.

(7) Remove screws securing escutcheons to each side of console and remove escutcheons.

(8) Remove screws securing channel beneath console and remove channel.

(9) Remove screws securing console cover to console and slide console cover aft on control column assembly.

(10) Set control wheel so that position indicator reads 0 and scribe a mark on control shaft and mounting structure.

(11) Unsolder copper cable connecting indicator drive drum to position indicator drum. Remove copper cable.

NOTE

Before unsoldering copper cable, note number of wraps of each copper cable and direction of wraps. Pay particular attention to manner in which copper cable is wrapped. This will aid in installation.

(12) Remove bolt securing position indicator drum to console. Remove position indicator drum.

(13) Remove screws securing control wheel and mounting bracket to console. Remove control wheel and mounting bracket.

(14) Remove bolt, washer, and nut and remove control wheel from shaft of cable drum. Remove mounting bracket and cable guard from shaft of cable drum.

(15) Remove pin and remove control cable (20) from cable drum.

b. Cleaning. Clean control and position indicator assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect control and position indicator assembly for cracks, bends, dents, and corrosion.

d. Repair or replacement. Repair of control and position indicator assembly consists of replacing any worn or damaged parts found during removal and inspection.

e. Installation. (1) Place exact center of control cable (20, figure 9-15) on cable drum and secure with pin.

(2) Wrap two turns of control cable (20) on cable drum beginning at outer groove. Wrap each side in opposite direction.

(3) Position cable guard and control wheel on shaft of cable drum. Secure control wheel on

shaft with bolt, washer, and nut.

(4) Position mounting on shaft of cable drum. Position mounting bracket with cable drum cable guard and control wheel on console and secure with screws.

(5) Place position indicator drum in console and install bolt.

(6) Set position indicator drum to read 0, align mark on control shaft and mounting structure made at time of removal.

(7) Install copper cable on position indicator drum and indicator drive drum in same manner as noted at time of removal. Solder copper cable.

(8) Rig elevator trim tab control system in accordance with paragraph 9-87. Secure turnbuckles (19) with lock wire.

(9) Install access cover on fuselage just below horizontal stabilizers.

(10) Position console cover on console and secure with screws.

(11) Position channel beneath console and secure with screws.

(12) Position escutcheon on each side of console and secure with screws.

(13) Position hanger fitting in console and secure with screws.

(14) Position knob for aileron trim tab control system on console and secure with pin and retaining ring.

(15) Install edge light panel on left and right subpanel.

(16) Position shield for control wheel on console and secure with screws.

9-93. CONTROL AND POSITION INDICATOR ASSEMBLY.(U-8F)

9-94. The control and position indicator assembly (1, figure 9-16) is located on the pedestal in the flight compartment.

a. Removal. (1) Remove IFF control panel in accordance with Chapter 13.

(2) Remove screws and remove access covers from left and front side of pedestal.

(3) Remove retaining ring and pin and remove knob for aileron trim tab control system.

(4) Remove edge light panel from pedestal.

(5) Remove access panel from tail section in baggage compartment.

(6) Remove lock wire from turnbuckles (16, figure 9-16) and relieve tension from control cable (22).

(7) Remove cotter pin, washer, and straight pin and remove position indicator drum from pedestal.

(8) Remove nut, washer, and screw and re-

move indicator gear from pedestal.

(9) Remove nut and washer and remove cable drum gear and cable drum from shaft of control wheel. Remove pin and remove control cable (22) from cable drum.

NOTE

Note number of turns and position of control cable (22) on cable drum.

(10) Remove cable guard from shaft of control wheel. Remove control wheel with shaft installed from pedestal.

(11) Remove bolt, washer, and nut and remove control wheel from shaft.

b. Cleaning. Clean control and position indicator assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect control and position indicator assembly for cracks, bends, dents, corrosion, and worn gears.

d. Repair or replacement. Repair of control and position indicator assembly consists of replacing any worn or damaged parts found during removal and inspection.

e. Installation. (1) Position shaft in control wheel and secure with bolt, washer, and nut. Position shaft with control wheel onto pedestal.

(2) Install control cable (22, figure 9-16) on cable as noted at time of removal.

(3) Install cable guard, cable drum, and cable drum gear on shaft of control wheel. Secure with washer and nut.

(4) Place position indicator drum in pedestal and secure with straight pin, washer, and cotter pin.

(5) Set position indicator drum to read 0 and mesh cogs of indicator gear with position indicator drum and cable drum gear. Secure in position with screw, washer, and nut.

(6) Rig elevator trim tab control system in accordance with paragraph 9-87. Secure turnbuckles (16) with lock wire.

(7) Install access panel in baggage compartment.

(8) Install edge light panel on pedestal.

(9) Position knob for aileron trim tab control system on pedestal. Secure with pin and retaining ring.

(10) Position access covers on front and left side of pedestal and secure with screws.

(11) Install IFF control panel in accordance with Chapter 13.

9-95. CONTROL CABLES. (U-8D, U-8G, RU-8D)

9-96. The control cables (5, 15, 18, and 20, figure 9-15) are 1/16-inch in diameter and made from corrosion-resistant steel wires. Control cables (5 and 15) are routed forward from the elevator trim tab actuators (7 and 13) and connected by turnbuckles (16) to the aft end of control cable (18). Control cable (20) is routed aft from the cable drum of the control and position indicator assembly (2) and connected to control cables (18) at turnbuckles (19). Control cables (18) are routed between turnbuckles (16) and turnbuckles (19).

a. Removal. (1) Remove carpet and floorboard from aft baggage compartment and cabin. (Refer to paragraphs 4-99 and 4-101, or 4-141 and 4-143.)

(2) Remove access panel from aft bulkhead of aft baggage compartment to gain access to fuselage tail section.

(3) Remove lock wire from turnbuckles (19, figure 9-15) and disconnect turnbuckles.

(4) Remove cable-retaining pin from bracket at pulleys (17).

(5) Remove bolts, washers, and nuts securing aft ends of control cables (18) to forward ends of turnbuckles (16) (at Y splice). Remove control cables (18).

(6) Connect lead lines to aft ends of control cable (20).

(7) Remove cable-retaining pins from brackets at pulleys (1, 3, 4, 21, and 22).

(8) Remove nut and washer securing cable drum gear and cable drum on shaft of control wheel of control and position indicator assembly (2). Remove cable drum gear, cable drum, and cable guard from shaft of control wheel.

(9) Remove pin securing control cable (20) on cable drum and remove control cable from cable drum.

(10) Pull control cable (20) from fuselage structure and disconnect lead lines from ends of control cable.

(11) Remove control cables (5 and 15) in accordance with paragraph 9-87.

(12) Remove bolts, washers, and nuts, and remove pulleys (1, 3, 4, 6, 9, 10, 11, 14, 17, 21, and 22) from brackets.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin pulleys with compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion.

NOTE

Replace control cables that are corroded or have three or more broken wires per inch. Replace control cables that have any broken wires if aircraft is to be placed on extended operation in area where replacement cables are not available.

(2) Inspect pulleys for cracks, dents, corrosion, and evidence of misalignment.

(3) Inspect brackets of pulleys for cracks, bends, corrosion, misalignment, and security of attachment.

d. Installation. (1) Position pulleys (1, 3, 4, 6, 9, 10, 11, 14, 17, 21, and 22, figure 9-15) on brackets and install bolts, washers, and nuts.

(2) Position exact center of control cable (20) on cable drum and secure with pin. Make two turns with each end of control cable on cable drum in opposite directions, starting at outer grooves.

(3) Position cable guard, cable drum, and cable drum gear on shaft of control wheel. Secure in position with washer and nut.

(4) Connect lead lines to ends of control cable (20) and pull control cable into position in fuselage structure. Disconnect lead lines from control cable.

(5) Install cable-retaining pins in brackets at pulleys (1, 3, 4, 21, and 22).

(6) Position control cables (18) on pulleys (17) and install cable-retaining pin in bracket for pulley.

(7) Connect control cables (18) to aft ends of control cable (20) with turnbuckles (19).

(8) Position aft right end of control cable (18) between forward ends of turnbuckles (16) for control cables (5) and install bolt, washer, and nut.

(9) Position aft left end of control cable (18) between forward ends of turnbuckles (16) for control cables (15) and install bolt, washer, and nut.

(10) Install control cables (5 and 15) in accordance with paragraph 9-87 and connect to turnbuckles (16) at Y splice.

(11) Rig elevator trim tab control system in accordance with paragraph 9-87. Ensure that turnbuckles (16 and 19) are secured with lock wire.

(12) Install access panel in aft baggage compartment.

(13) Install floorboard and carpet in aft baggage compartment and cabin.

9-97. CONTROL CABLES.(U-8F)

9-98. The control cables (3, 13, 15, and 22, figure 9-16) are 1/16-inch in diameter and made from corrosion-resistant steel wires. Control cables (3 and 13) are routed from the elevator trim tab actuators (5 and 11) forward, and connected at turnbuckles (14) to control cables (15). Control cable (22) is routed from the cable drum of the control and position indicator assembly (1) aft through the fuselage to turnbuckles (16). Control cables (15) are routed between turnbuckles (14) and turnbuckles (16).

a. Removal. (1) Remove pilot's seat and left passenger seats. (Refer to paragraphs 4-159 and 4-191.)

(2) Remove carpet from seat decks, compartment divider panel, and by cabin door. (Refer to paragraph 4-175.)

(3) Remove left and center floor webs from flight compartment and floor web just behind compartment divider panels. (Refer to paragraph 4-177.)

(4) Remove IFF control panel. (Refer to Chapter 13.)

(5) Remove screws and remove front and left access covers from pedestal.

(6) Remove retaining ring and pin and remove knob for aileron trim tab control system from pedestal.

(7) Remove edge light panel from pedestal.

(8) Remove access panels from left passenger seat deck, baggage compartment floor and bulkhead, and cabin floor just aft of left passenger seat deck.

(9) Remove cable-retaining pins from brackets at pulleys (2, 17, 19, 20, and 21, figure 9-16).

(10) Remove lock wire from turnbuckles (16) and remove turnbuckles from aft ends of control cable (22). Connect lead lines to ends of control cable.

(11) Remove bolts, washers, and nuts connecting control cables (15) to turnbuckles (14) (at Y-splice).

(12) Remove nut and washer securing cable drum, cable guard, and cable drum gear on shaft of control wheel for control and position indicator assembly (1).

(13) Remove control wheel and shaft from pedestal. Remove cable drum, cable guard, and cable drum gear, as an assembly, from pedestal.

(14) Pull control cable (22) from fuselage structure. Remove pin and remove control cable from cable drum. Note number of wraps of control cable on cable drum.

(15) Disconnect lead lines from ends of control cable (22).

(16) Remove control cables (3 and 13) in accordance with paragraph 9-87.

(17) Remove bolts, washers, and nuts and remove pulleys, if required, from brackets.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin pulleys with compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion.

NOTE

Replace control cables that are corroded or have three or more broken wires per inch. Replace control cables that have any broken wires if aircraft is to be placed on extended operations in area where replacement cables are not available.

(2) Inspect pulleys for cracks, dents, corrosion and evidence of misalignment.

(3) Inspect brackets of pulleys for cracks, bends, corrosion, misalignment, and security of attachment.

d. Installation. (1) Position pulleys, if removed, in brackets and install bolts, washers, and nuts.

(2) Place exact center of control cable (22, figure 9-16) on cable drum and secure with pin. Wrap control cable around cable drum, same number of turns noted at time of removal.

(3) Connect lead lines to end of control cable (22) and pull control cable into position in fuselage structure. Disconnect lead lines.

(4) Position cable drum, cable guard, and cable drum gear, as an assembly and secure with washer and nut.

(5) Install cable-retaining pins in brackets at pulleys (2, 17, 19, 20, and 21).

(6) Position control cables (15) in fuselage tail section and connect forward ends to control cable (22) with turnbuckles (16). Ensure that turnbuckles (16) are secured with lock wire.

(7) Position turnbuckles (14) on aft ends of control cables (15) and secure with bolts, washers, and nuts.

(8) Install control cables (3 and 13) in accordance with paragraph 9-87.

(9) Rig elevator trim tab control system in accordance with paragraph 9-87. Ensure that turnbuckles (14 and 16) are secured with lock wire.

(10) Install access panels on left passenger seat deck, baggage compartment, floor and bulk-

head, and cabin floor just aft of left passenger seat deck.

(11) Install edge light panel on pedestal.

(12) Install knob for aileron trim tab control system on pedestal and secure with pin and retaining ring.

(13) Position front and left access covers on pedestal and secure with screws.

(14) Install IFF control panel. (Refer to Chapter 13.)

(15) Install left and center floor webs in flight compartment and floor web just behind compartment divider panels. (Refer to paragraph 4-177.)

(16) Install carpet on seat decks, compartment divider panel, and at cabin door. (Refer to paragraph 4-175.)

(17) Install left passenger seats and pilot's seat. (Refer to paragraph 4-159 and 4-191.)

9-99. RUDDER CONTROL SYSTEM.

9-100. The rudder control system (figure 9-17 or 9-18) consists of a rudder, two rudder pedal assemblies, two forward bellcranks, a rudder bellcrank, control rods, control cables, and pulleys. The rudder control system is operated by the pilot's or copilot's rudder pedal assembly. Rig the rudder control system as follows:

a. Remove cabin compartment carpets and floorboard (U-8D, U-8G, and RU-8D) or carpets and forward floor webs (U-8F). (Refer to paragraphs 4-82 and 4-84; 4-131 and 4-133; or 4-206 and 4-208.)

b. Remove access covers on fuselage just below horizontal stabilizers.

c. Remove tail cone. (Refer to paragraph 4-228.)

d. Release adjusting levers for pilot's rudder pedals and position pilot's rudder pedals in aft position.

e. Install rudder lock or an aligning pin in rudder pedals. (Refer to paragraph 1-105.)

f. Adjust control rods (13, figure 9-17 or 15, figure 9-18) to place forward bellcrank (5, figure 9-17, or 14, figure 9-18) in neutral position (at 90-degree angle with aircraft centerline).

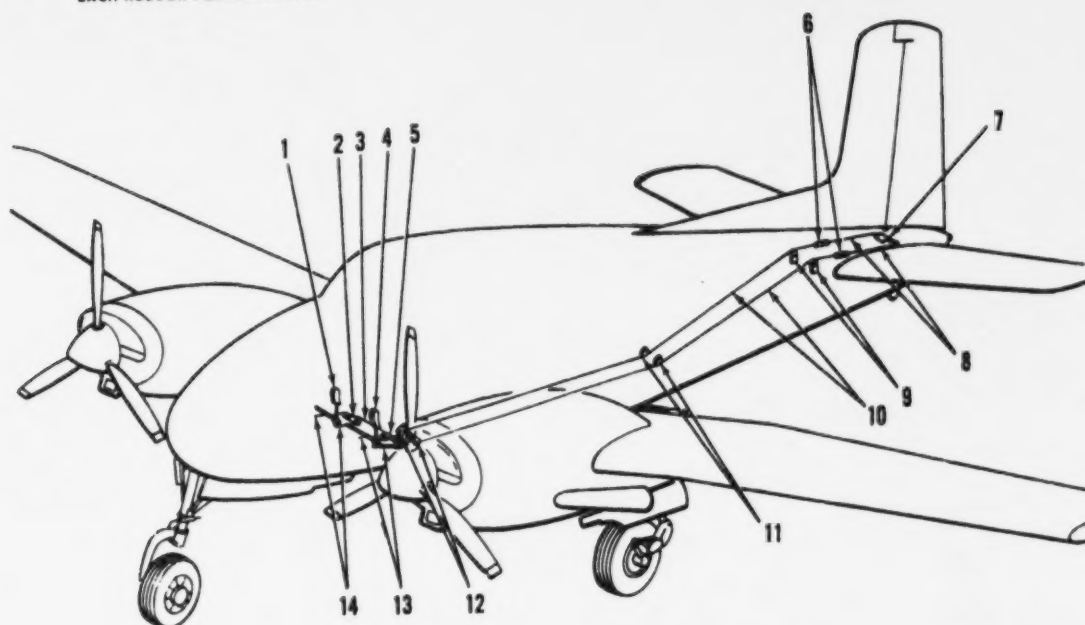
g. Adjust control rods (14, figure 9-17, or 16, figure 9-18), as necessary, to align copilot's rudder pedals.

h. Secure rudder in neutral position with a control surface lock.

i. Remove lock wire from turnbuckles (6, figure 9-17, or 9, figure 9-18).

j. Adjust control cables (8 and 10, figure 9-17, or 8 and 11, figure 9-18) in accordance with paragraph 9-123.

NOTE: RIGHT RUDDER PEDAL REMOVED FROM EACH RUDDER PEDAL ASSEMBLY



- | | | |
|----------------------|---------------------|------------------|
| 1. Rudder pedal | 6. Turnbuckles | 11. Pulleys |
| 2. Forward bellcrank | 7. Rudder bellcrank | 12. Pulleys |
| 3. Control rod | 8. Control cables | 13. Control rods |
| 4. Rudder pedal | 9. Pulleys | 14. Control rods |
| 5. Forward bellcrank | 10. Control cables | |

Figure 9-17. Rudder control system (U-8D, U-8G, RU-8D)

CAUTION

Tension shall be applied equally to each control cable to maintain neutral position of forward bellcrank (5, figure 9-17, or 14, figure 9-18) and rudder.

k. Remove rudder lock or aligning pin from pilot's rudder pedals and control surface lock from rudder.

l. Check rudder for limits of travel as specified in table 9-1. Adjust rudder stops at rudder bellcrank (7, figure 9-17, or 10, figure 9-18), as necessary, to obtain proper travel limits.

NOTE

If a travel board is used for checking rudder travel, the travel board should be located at rudder station 36.188.

m. Adjust bellcrank stops at forward bellcrank (5, figure 9-17, or 14, figure 9-18) for 1/8-inch clearance when rudder stops have reached their full travel.

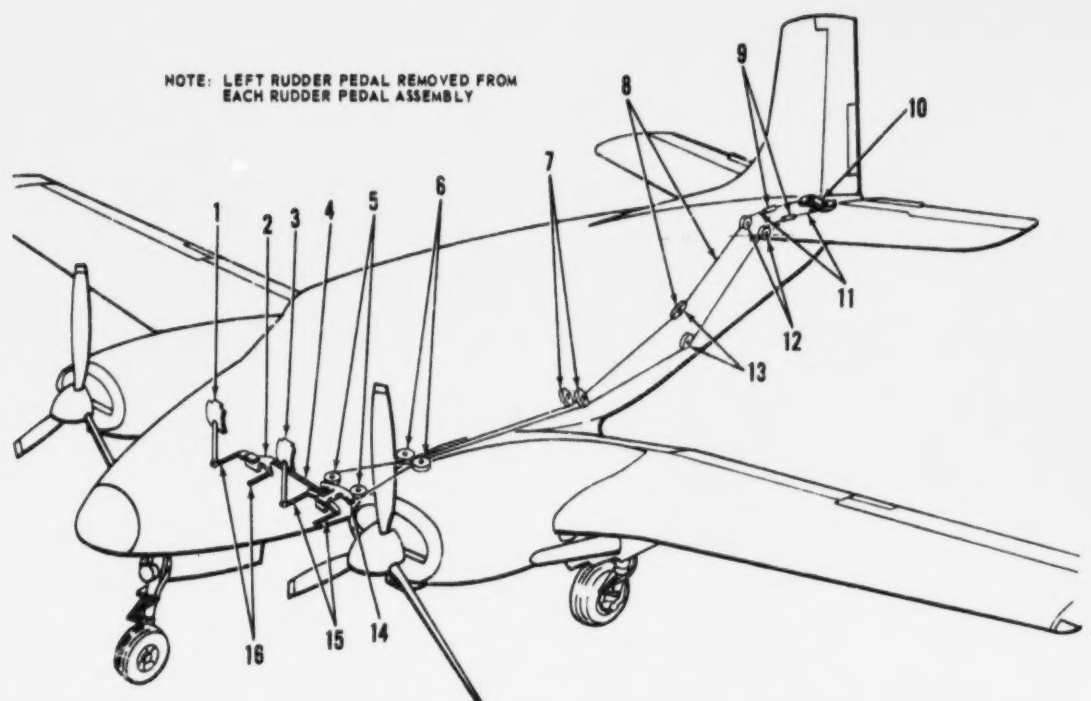
n. Install tail cone. (Refer to paragraph 4-228.)

o. Install access covers on fuselage below horizontal stabilizers. Install cabin compartment carpets and floorboards (U-8D, U-8G, and RU-8D) or carpets and forward floor webs (U-8F). (Refer to paragraphs 4-82 and 4-84; 4-131 and 4-133; or 4-206 and 4-208.)

9-101. RUDDER PEDAL ASSEMBLIES.

9-102. The rudder pedal assemblies consist of the pilot's rudder pedal assembly and copilot's rudder pedal assembly. (See figure 9-17 or 9-18.) Each rudder pedal assembly consists of two rudder pedals, two adjusting levers, two

NOTE: LEFT RUDDER PEDAL REMOVED FROM EACH RUDDER PEDAL ASSEMBLY



- | | | | |
|----------------------|-------------------|----------------------|-----------------------|
| 1. Rudder pedal | 5. Pulleys | 9. Turnbuckles | 13. Pulleys |
| 2. Forward bellcrank | 6. Pulleys | 10. Rudder bellcrank | 14. Forward bellcrank |
| 3. Rudder pedal | 7. Pulleys | 11. Control cables | 15. Control rods |
| 4. Control rod | 8. Control cables | 12. Pulleys | 16. Control rods |

Figure 9-18. Rudder control system (U-8F)

idler arms, two control rods, and a torque tube. The steering arm for nose gear steering mechanism is located on torque tube for pilot's rudder pedal assembly. The control rods connect the idler arms on torque tubes to the forward bellcrank aft of each rudder pedal assembly. A brake cylinder is connected to each rudder pedal.

a. Removal. (1) Remove cabin compartment carpets and floorboard (U-8D, U-8G, and RU-8D) or carpets and forward floor webs (U-8F) to gain access to rudder pedal assemblies. (Refer to paragraphs 4-82 and 4-84; 4-131 and 4-133; or 4-206 and 4-208.)

(2) Remove upper end of each brake cylinder from each rudder pedal by removing cotter pin, pin, and washer.

(3) Remove control rods (13 and 14, figure 9-17, or 15 and 16, figure 9-18) from idler arms on torque tubes and forward bellcranks

(2 and 5, figure 9-17, or 2 and 14, figure 9-18) by removing cotter pins, bolts, washers, and nuts.

(4) Disconnect control rod for nose gear steering mechanism from steering arm on torque tube of pilot's rudder pedal assembly by removing cotter pin, bolt, washer, and nut.

(5) Remove bolts, washers, and nuts securing collars on torque tubes on inboard side of rudder pedals.

(6) Remove bolts securing inboard torque tube supports and move torque tubes inboard until they are free of outboard torque tube supports. Lift rudder pedal assemblies up and out of structure.

b. Cleaning. Clean rudder pedal assemblies with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect rudder pedals assemblies for cracks, dents, bends, and corrosion.

d. Installation. (1) Position outboard end of torque tubes in outboard torque tube supports and inboard torque tube supports on structure and install bolts.

(2) Align holes in collars with holes in torque tubes and install bolts, washers, and nuts.

(3) Position aft end of control rod for nose gear steering mechanism on steering arm on torque tube of pilot's rudder pedal assembly and install bolt, washer, nut, and cotter pin.

(4) Position forward ends of control rods (13 and 14, figure 9-17, or 15 and 16, figure 9-18) on idler arms on torque tubes and install bolts, washers, nuts and cotter pins.

(5) Position aft ends of control rods (13, figure 9-17 or 15, figure 9-18) on forward bellcranks (5, figure 9-17 or 14, figure 9-18) and install bolts, washers, nuts and cotter pins.

(6) Position aft ends of control rods (14, figure 9-17 or 16, figure 9-18) on forward bellcrank (2, figure 9-17, or 2, figure 9-18) and install bolts, washers, nuts, and cotter pins.

(7) Position upper end of each brake cylinder on each rudder pedal and install pin, washer, and cotter pin.

(8) Rig rudder control system, as required, in accordance with paragraph 9-99.

(9) Install cabin compartment carpets and floor board (U-8D, U-8G, and RU-8D) or carpets and forward floor webs (U 8F). (Refer to paragraphs 4-82 and 4-84; 4-131 and 4-133; or 4-206 and 4-208.)

9-103. BELLCRANKS. (U-8D, U-8G, RU-8D)

9-104. The bellcranks for the rudder control system consist of the forward bellcranks (2 and 5, figure 9-16) and rudder bellcrank (7). The forward bellcranks are connected to idler arms on torque tubes by control rods (13 and 14) and to each other by control rod (3). Control cables (10) are connected only to forward bellcrank (5) and control cables (8) are connected to the rudder bellcrank.

a. Removal. (1) Remove carpets and floorboard from flight compartment to gain access to forward bellcranks (2 and 5, figure 9-17).

(2) Remove access covers on fuselage just below horizontal stabilizers to gain access to turnbuckles (6).

(3) Remove lock wire from turnbuckles (6) and loosen turnbuckles to relieve tension on control cables (8 and 10).

(4) Remove control rod from forward bellcranks (2 and 5) by removing cotter pins, bolts, washers, and nuts.

(5) Remove aft ends of control rods (13 and

14) from forward bellcranks (2 and 5) by removing cotter pins, bolts, washers, and nuts.

(6) Remove ends of control cables (10) from forward bellcrank (5) by removing screws and lock plates.

(7) Remove forward bellcranks (2 and 5) from supports by removing cotter pins, bolts, washers, and nuts.

(8) Remove tail cone to gain access to rudder bellcrank (7). (Refer to paragraph 4-228.)

(9) Remove ends of control cables (8) from rudder bellcrank (7) by removing screws and lock plates.

(10) Remove rudder bellcrank (7) from rudder torque tube fitting by removing cotter pins, bolts, washers, and nuts.

(11) Remove rudder bellcrank (7) and support from fuselage tail section bulkhead by removing bolts, washers, and nuts.

(12) Remove rudder bellcrank (7) from support by removing cotter pin, bolt, washer, and nut.

b. Cleaning. Clean forward and rudder bellcranks with dry cleaning solvent (item 6, table 1-9) and dry with filtered, compressed air.

c. Inspection. Inspect forward and rudder bellcranks for bends, cracks, dents, and elongated bolt holes.

d. Installation. (1) Position rudder bellcrank (7, figure 9-17) on support and secure with bolt, washer, nut, and cotter pin.

(2) Position support with rudder bellcrank (7) attached on fuselage tail section bulkhead and secure with bolts, washers, and nuts.

(3) Position rudder torque tube fitting on rudder bellcrank (7) and secure with bolts, washers, nuts, and cotter pins.

(4) Position aft ends of control cables (8) with lock plates on rudder bellcrank (7) and secure with screws.

(5) Position forward bellcranks (2 and 5) on supports and install bolts, washers, nuts and cotter pins.

(6) Position forward ends of control cables (10) with lock plates on forward bellcrank (5) and secure with screws.

(7) Position ends of control rod (3) on forward bellcranks (2 and 5) and install bolts, washers, nuts, and cotter pins.

(8) Position aft ends of control rods (13 and 14) of forward bellcranks (2 and 5) and install bolts, washers, nuts, and cotter pins.

(9) Rig rudder control system in accordance with paragraph 9-99. Secure turnbuckles (6) with lock wire.

(10) Install access covers on fuselage below horizontal stabilizers.

(11) Install tail cone. (Refer to paragraph

4-228.)

(12) Install floorboard and carpets in flight compartment. (Refer to paragraphs 4-82 and 4-84; 4-131 and 4-133; or 4-206 and 4-208.)

9-105. BELLCRANKS.(U-8F)

9-106. The bellcranks for the rudder control system consist of the forward bellcranks (2 and 14, figure 9-18) and rudder bellcranks (10). The forward bellcranks are connected to idler arms on torque tubes by control rods (15 and 16) and to each other by control rod (4). Control cables (8) are connected to forward bellcrank (14) only and control cables (11) are connected to the rudder bellcrank.

a. Removal. (1) Remove pilot's and copilot's seats, carpets, and forward floor webs to gain access to forward bellcranks (2 and 14, figure 9-18). (Refer to paragraphs 4-159, 4-175, and 4-177.)

(2) Remove access covers on fuselage just below horizontal stabilizers to gain access to turnbuckles (9).

(3) Remove lock wire from turnbuckles (9) and loosen turnbuckles to relieve tension from control cables (8 and 11).

(4) Remove screws securing lock plates and forward ends of control cables (8) to forward bellcrank (14).

(5) Remove cotter pins, bolts, washers, and nuts securing aft ends of control rods (15 and 16) to forward bellcranks (2 and 14).

(6) Remove cotter pins, bolts, washers, and nuts securing ends of control rod (4) to forward bellcranks (2 and 14) and remove control rod.

(7) Remove cotter pins, bolts, washers, and nuts securing forward bellcranks (2 and 14) to supports and remove forward bellcranks.

(8) Remove tail cone to gain access to rudder bellcrank (10). (Refer to paragraph 4-228.)

(9) Remove screws securing lock plates and aft ends of control cables (11) on rudder bellcranks (10).

(10) Remove cotter pins, bolts, washers, and nuts securing rudder torque tube fitting on rudder bellcrank (10).

(11) Remove bolts, washers, and nuts securing support for rudder bellcrank (10) on fuselage tail section bulkhead. Remove support and rudder bellcrank.

(12) Remove cotter pin, bolt, washer, and nut securing rudder bellcrank (10) on support and remove rudder bellcrank.

b. Cleaning. Clean forward and rudder bellcranks with dry cleaning solvent (item 6, table

1-8) and dry with filtered, compressed air.
c. Inspection. Inspect forward and rudder bellcranks for cracks, dents, bends, and elongated bolt holes.

d. Installation. (1) Position rudder bellcrank (10, figure 9-18) on support and install bolt, washer, nut, and cotter pin.

(2) Position support with rudder bellcranks (10) attached to fuselage tail section bulkhead and secure with bolts, washers, and nuts.

(3) Position rudder torque tube fitting on rudder bellcrank (10) and install bolts, washers, nuts, and cotter pins.

(4) Position aft ends of control cables (11) with lock plates on rudder bellcrank (10) and secure lock plates with screws.

(5) Position forward bellcranks (2 and 14) on supports and install bolts, washers, nuts, and cotter pins.

(6) Position forward ends of control cables (8) with lock plates on forward bellcrank (14) and secure lock plates with screws.

(7) Position aft ends of control rods (15 and 16) on forward bellcranks (2 and 14) and install bolts, washers, nuts, and cotter pins.

(8) Rig rudder control system in accordance with paragraph 9-99. Secure turnbuckles (9) with lock wire.

(9) Install tail cone. (Refer to paragraph 4-228.)

(10) Install access covers on fuselage below horizontal stabilizers.

(11) Install forward floor webs, carpets, and pilot's and copilot's seats. (Refer to paragraphs 4-159, 4-175, and 4-177.)

9-107. CONTROL CABLES.(U-8D, U-8G, RU-8D)

9-108. The control cables for the rudder control system consist of two control cables (8, figure 9-17) and two control cables (10). Control cables (8) are connected to rudder bellcranks (7) and routed forward to turnbuckles (6). Control cables (10) are connected to forward bellcrank (5) and routed aft around pulleys (9, 11, and 12). Control cables (8 and 10) are connected together in aft fuselage section with turnbuckles (6).

a. Removal. (1) Remove carpets and floorboard from flight compartment and aft baggage compartment. (Refer to paragraphs 4-82 and 4-84, or 4-131 and 4-133.)

(2) Remove tail cone. (Refer to paragraph 4-228.)

(3) Remove access panel in aft baggage compartment and access covers of fuselage just below horizontal stabilizers.

(4) Remove lock wire from turnbuckles (6, figure 9-17) and loosen turnbuckles to relieve tension from control cables (8 and 10).

(5) Remove screws securing lock plates and forward ends of control cables (10) on forward bellcrank (5).

(6) Connect lead lines to forward ends of control cables (10).

(7) Remove screws securing lock plates and aft end of control cables (8) to rudder bellcranks (7).

(8) Remove cable-retaining pins from brackets at pulleys (9, 11, and 12).

(9) Pull control cables (8 and 10) out through aft fuselage section bulkhead and disconnect lead lines.

(10) Remove bolts, washers, and nuts securing pulleys (9, 11, and 12) in brackets and remove pulleys.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin pulleys with compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion.

NOTE

Replace control cables that are corroded or have six or more broken wires per inch. Replace control cables that have any broken wires if aircraft is to be placed on extended operation in area where replacement cables are not available.

(2) Inspect pulleys for cracks, dents, bends, corrosion, and evidence of misalignment.

(3) Inspect brackets of pulleys for cracks, bends, corrosion, and misalignment.

d. Installation. (1) Position pulleys (9, 11, and 12, figure 9-17) on brackets and install bolts, washers, and nuts.

(2) Connect lead lines to forward ends of control cables (8 and 10).

(3) Pull control cables (8 and 10) into position in fuselage structure and pulleys (9, 11, and 12). Disconnect lead lines.

(4) Install cable-retaining pins in brackets at pulleys (9, 11, and 12).

(5) Position forward ends of control cables (10) with lock plates on forward bellcrank (5) and secure lock plates with screws.

(6) Position aft ends of control cables (8)

with lock plates on rudder bellcrank (7) and secure lock plates with screws.

(7) Adjust control cables (8 and 10) in accordance with paragraph 9-123. Secure turnbuckles (6) with lockwire.

(8) Install access panel in aft baggage compartment and access covers on fuselage below horizontal stabilizers.

(9) Install tail cone. (Refer to paragraph 4-228.)

(10) Install floorboard and carpets in flight and aft baggage compartments. (Refer to paragraphs 4-82 and 4-84, or 4-131 and 4-133.)

9-109. CONTROL CABLES. (U-8F)

9-110. The control cables for the rudder control system consist of two control cables (8, figure 9-18) and two control cables (11). Control cables (11) are connected to rudder bellcrank (10) and routed forward to turnbuckles (9). Control cables (8) are connected to forward bellcrank (14) and routed aft around pulleys (5, 6, 7, 12, and 13). The control cables are connected in the aft fuselage section with turnbuckles (9).

a. Removal. (1) Remove pilot's seat, carpet, and floor webs in flight compartment. (Refer to paragraphs 4-159, 4-175, and 4-177.)

(2) Remove left passenger seats, carpets, access panels, and floor webs in cabin. (Refer to paragraphs 4-191, 4-206, 4-208.)

(3) Remove access panel in baggage compartment to gain access to fuselage tail section.

(4) Remove tail cone. (Refer to paragraph 4-228.)

(5) Remove lock wire from turnbuckles (9, figure 9-18) to relieve tension on control cables (8 and 11).

(6) Remove screws securing lock plates and forward ends of control cables (8) on forward bellcrank (14). Connect lead lines to ends of control cables.

(7) Remove cable-retaining pins from brackets at pulleys (5, 6, 7, 12, and 13).

(8) Remove screws securing lock plates and aft ends of control cables (11) on rudder bellcrank (10).

(9) Pull control cables (8 and 11) out through aft fuselage section bulkhead and disconnect lead lines.

(10) Remove bolts, washers, and nuts securing pulleys (5, 6, 7, 12, and 13) to brackets and remove pulleys.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin pulleys with compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion.

NOTE

Replace control cables that are corroded or have six or more broken wires per inch. Replace control cables that have any broken wires if aircraft is to be placed on extended operation in area where replacement cables are not available.

(2) Inspect pulleys for cracks, dents, bends, corrosion, and evidence of misalignment.

(3) Inspect brackets of pulleys for cracks, bends, corrosion, and misalignment.

d. Installation. (1) Position pulleys (5, 6, 7, 12, and 13, figure 9-18) on brackets and secure with bolts, washers, and nuts.

(2) Connect lead lines to forward ends of control cables (8 and 11).

(3) Pull control cables (8 and 11) into position in fuselage structure and pulleys (5, 6, 7, 12, and 13). Disconnect lead lines.

(4) Position forward ends of control cables (8) with lock plates on forward bellcrank (14) and secure lock plates with screws.

(5) Install cable-retaining pins in brackets at pulleys (5, 6, 7, 12, and 13).

(6) Position aft ends of control cables (11) with lock plates on rudder bellcrank (10) and secure lock plates with screws.

(7) Adjust control cables (8 and 11) in accordance with paragraph 9-123. Secure turnbuckles (9) with lock wire.

(8) Install tail cone. (Refer to paragraph 4-228.)

(9) Install access panel in baggage compartment.

(10) Install floor webs, access panels, carpets, and left passenger seats in cabin. (Refer to paragraphs 4-191, 4-206, and 4-208.)

(11) Install floor webs, carpet, and pilot's seat in flight compartment. (Refer to paragraphs 4-159, 4-175, and 4-177.)

9-111. RUDDER TRIM TAB CONTROL SYSTEM.

9-112. The rudder trim tab control system (figure 9-19 and 9-20) consists of a rudder trim tab, control rod, rudder trim tab actuator, control cables, pulleys, and control and position

indicator assembly. The rudder trim tab control system is operated by turning the control wheel of the control and position indicator assembly.

a. Rig the U-8D, U-8G, and RU-8D rudder trim tab control system as follows:

(1) Remove access panel in aft baggage compartment to gain access to turnbuckles (11, figure 9-19.)

(2) Disconnect control rod from actuator screw of rudder trim tab actuator (6) by removing cotter pin, bolt, washer, and nut.

(3) Turn control wheel of control and position indicator assembly (1) until turnbuckles (11) are aligned with each other.

(4) Remove lock wire from turnbuckles (11) and adjust control cables (5 and 12) in accordance with paragraph 9-123.

(5) Set actuator screw of rudder trim tab actuator (6) to mid-point of travel.

(6) Position end of control rod on actuator screw of rudder trim tab actuator (6) and install bolt, washer, nut, and cotter pin.

(7) Position rudder trim tab (7) in neutral position and adjust control rod as necessary to position rudder trim tab in neutral.

(8) Adjust rudder trim tab travel to limits specified in table 9-1 by adjusting cable stops in fuselage tail section. Use rudder trim tab travel board, part No. 50-590094, FSN 5220-545-6081 to measure travel.

(9) Check position indicator for 0 reading with rudder trim tab (7) in neutral position.

(10) Adjust position indicator, if required, as follows:

(a) Remove retaining ring and pin and remove knob for aileron trim tab control system from console.

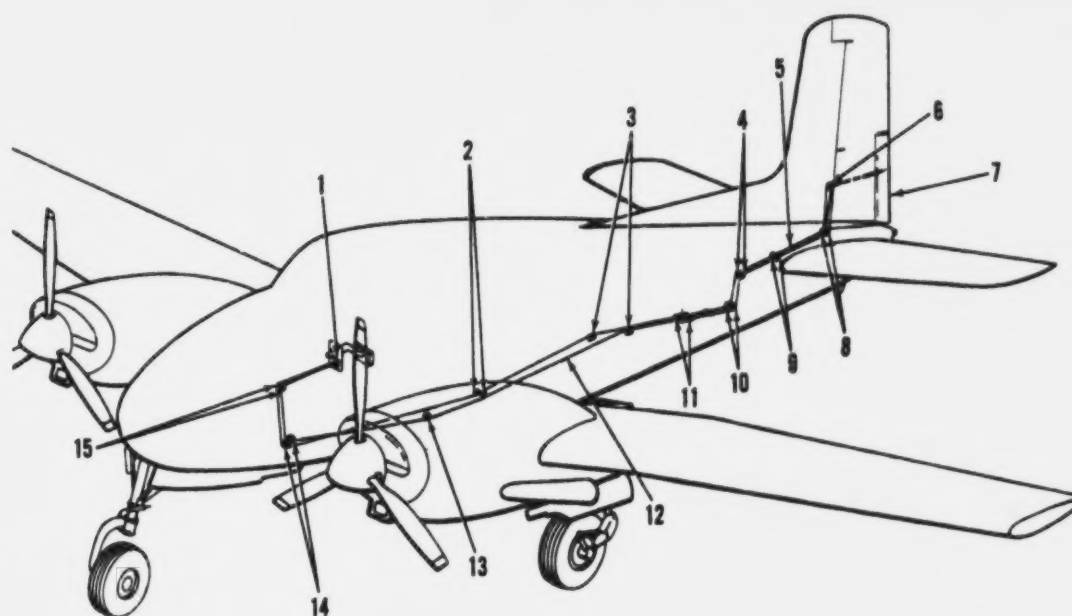
(b) Remove screws securing hanger fitting and cover on console. Slide hanger fitting and cover aft on control column assembly.

(c) Remove nut and disengage position indicator drum gear from gear on control shaft. Turn position indicator to read 0 and mesh position indicator drum gear with gear on control shaft. Secure position indicator with nut.

(d) Position cover and hanger fitting on console and secure with screws.

(e) Position knob for aileron trim tab control system on console and install pin and retaining ring.

(11) Perform a visual check to ensure that rudder trim tab (7) movement corresponds to movement of control wheel of control and position indicator assembly (1). Turn control wheel in direction of NOSE LEFT; rudder trim tab moves right. Turn control wheel in direction of NOSE RIGHT; rudder trim tab moves left.



1. Control and position indicator assembly
2. Pulleys
3. Pulleys
4. Pulleys
5. Control cable

6. Rudder trim tab actuator
7. Rudder trim tab
8. Pulleys
9. Pulleys
10. Pulleys

11. Turnbuckles
12. Control cable
13. Pulley
14. Pulleys
15. Pulleys

Figure 9-19. Rudder trim tab control system (U-8D, U-8G, RU-8D)

(12) Secure turnbuckles (11) with lock wire and install access panel in aft baggage compartment.
b. Rig the U-8F rudder trim tab control system as follows:

(1) Remove access panel in baggage compartment in cabin to gain access to turnbuckles (10, figure 9-20.)

(2) Disconnect control rod from actuator screw of rudder trim tab actuator (5) by removing cotter pin, bolt, washer, and nut.

(3) Move control wheel of control and position indicator assembly (1) until turnbuckles (10) are aligned with each other.

(4) Remove lock wire from turnbuckles (10) and adjust control cables (4 and 11) in accordance with paragraph 9-123.

(5) Set actuator screw of rudder trim tab actuator (5) to mid-point of travel.

(6) Position end of control rod on actuator screw of rudder trim tab actuator (5) and secure with bolt, washer, nut, and cotter pin.

(7) Position rudder trim tab (6) in neutral position and adjust control rod as necessary to position rudder trim tab in neutral.

(8) Adjust rudder trim tab travel to limits specified in table 9-1 by adjusting cable stops in fuselage tail section. Use rudder trim tab travel board, part No. 50-590094, FSN 5220-545-6081, to measure travel.

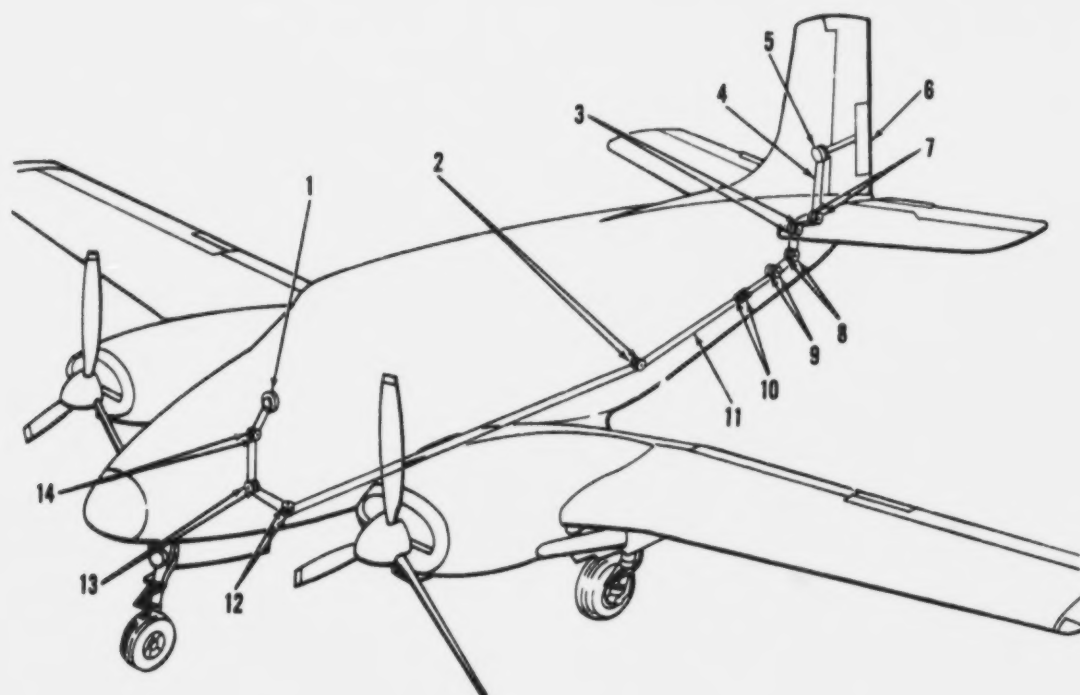
(9) Check position indicator for 0 reading with rudder trim tab (6) in neutral position.

(10) Adjust position indicator, if required, as follows:

(a) Remove edge light panel from pedestal in flight compartment.

(b) Remove access covers from front and sides of pedestal.

(c) Remove cotter pin and disengage gear on position indicator from driven gear. With position indicator reading 0, mesh gear on position indicator with driven gear and secure in position with cotter pin.



- | | | | |
|--|-----------------------------|-----------------|-------------------|
| 1. Control and position indicator assembly | 5. Rudder trim tab actuator | 6. Pulleys | 11. Control cable |
| 2. Pulleys | 6. Rudder trim tab | 9. Pulleys | 12. Pulleys |
| 3. Pulleys | 7. Pulleys | 10. Turnbuckles | 13. Pulleys |
| 4. Control cable | | | 14. Pulleys |

Figure 9-20. Rudder trim tab control system (U-8F)

(d) Install access covers and edge light panel on pedestal.

(11) Perform a visual check to ensure that rudder trim tab (6) movement corresponds to movement of control wheel of control and position indicator assembly (1). Turn control wheel in direction of NOSE LEFT; rudder trim tab moves right. Turn control in direction of NOSE RIGHT; rudder trim tab moves left.

(12) Secure turnbuckles (10) with lock wire and install access panel in baggage compartment.

9-113. RUDDER TRIM TAB ACTUATOR.

9-114. The rudder trim tab actuator (6, figure 9-19, or 5, figure 9-20) is mounted to the trailing edge of the vertical stabilizer. A control rod connects the rudder trim tab actuator to the rudder trim tab (7, figure 9-19, or 6,

figure 9-20).

a. Removal. (1) Remove tail cone. (Refer to paragraph 4-228.)

(2) Remove access covers from fuselage just below horizontal stabilizers.

(3) Remove access covers on vertical stabilizer to gain access to rudder trim tab actuator (6, figure 9-19, or 5, figure 9-20.)

(4) Remove access panel in baggage compartment to gain access to turnbuckles in fuselage tail section.

(5) Remove lock wire from turnbuckles (11, figure 9-19, or 10, figure 9-20) and disconnect turnbuckles from control cable (5, figure 9-18, or 4, figure 9-20).

(6) Connect lead lines to ends of control cable (5, figure 9-19, or 4, figure 9-20).

(7) Remove cotter pin, bolt, washer, and nut connecting control rod to actuator screw of rudder trim tab actuator (6, figure 9-19, or 5,

figure 9-20).

(8) Remove cable-retaining pins from brackets at pulleys (4, 8, 9, and 10, figure 9-19, or 3, 7, 8, and 9, figure 9-20).

(9) Remove screws securing rudder trim tab actuator (6, figure 9-19, or 5, figure 9-20) to spar of vertical stabilizer. Remove rudder trim tab actuator and control cable (5, figure 9-19, or 4, figure 9-20).

(10) Remove bolts, washers, and nuts and remove mounting bracket from rudder trim tab actuator housing.

(11) Remove cable drum with control cable from rudder trim tab actuator housing. Remove pin and remove control cable from cable drum.

b. Cleaning. Clean rudder trim tab actuator with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect rudder trim tab actuator for cracks, dents, bends, and corrosion.

d. Installation. (1) Position exact center of control cable (5, figure 9-19, or 4, figure 9-20) on cable drum and install pin. Wind ends of control cable in opposite directions around cable drum 2-1/2 turns.

(2) Position cable drum with control cable into rudder trim tab actuator housing. Position mounting bracket on rudder trim tab actuator housing and install bolts, washers, and nuts.

(3) Connect lead lines to ends of control cable (5, figure 9-19, or 4, figure 9-20). Pull control cable into position on pulleys (4, 8, 9, and 10, figure 9-19, or 3, 7, 8, and 9, figure 9-20) and install cable-retaining pins in brackets at pulleys.

(4) Position rudder trim tab actuator (6, figure 9-19, or 5, figure 9-20) on spar of vertical stabilizer and secure with screws.

(5) Disconnect lead lines from control cable (5, figure 9-19, or 4, figure 9-20) and connect control cable to turnbuckles (11, figure 9-19, or 10, figure 9-20).

(6) Position end of control rod on actuator screw of rudder trim tab actuator (6, figure 9-19, or 5, figure 9-20) and secure with bolt, washer, nut, and cotter pin.

(7) Rig rudder trim tab control system in accordance with paragraph 9-111. Secure turnbuckles (11, figure 9-19, or 10, figure 9-20) with lock wire.

(8) Install access covers on fuselage below horizontal stabilizers and vertical stabilizer.

(9) Install tail cone. (Refer to paragraph 4-228.)

(10) Install access panel in baggage compartment.

9-115. CONTROL CABLES. (U-8D, U-8G, RU-8D)

9-116. The control cables for the rudder trim tab control system consist of control cables (5, and 12, figure 9-19). Control cable (5) is connected to rudder trim tab actuator (6) and routed forward around pulleys (4, 8, 9, and 10) to turnbuckles (11). Control cable (12) is connected to the cable drum of control and position indicator assembly (1) and routed aft around pulleys (2, 3, 13, 14, and 15) to turnbuckles (11).

a. Removal. (1) Remove access panel in aft baggage compartment to gain access to turnbuckles (11, figure 9-19).

(2) Remove lock wire from turnbuckles (11) and disconnect turnbuckles from ends of control cable (12).

(3) Connect lead lines to ends of control cable (12).

(4) Remove pilot's and copilot's seats and passenger seats. (Refer to paragraph 4-57, 4-60, and 4-63; or 4-174 and 4-120.)

(5) Remove carpets and floorboard from flight compartment and cabin. (Refer to paragraphs 4-82 and 4-84 or 4-141 and 4-143.)

(6) Remove cable-retaining pins from brackets at pulleys (2, 3, 13, 14, and 15).

(7) Remove retaining ring and pin and remove knob for aileron trim tab control system from console.

(8) Remove screws securing hanger fitting and cover on console. Slide hanger fitting and cover aft on control column assembly.

(9) Remove bolt, washer, and nut and remove control wheel from control shaft of control and position indicator assembly (1).

(10) Remove tapered pin, washer, and nut and remove cable drum from control shaft.

(11) Unwind control cable (12) from around cable drum. Remove pin and remove control cable. Note number of turns of control cable on cable drum.

(12) Pull control cable (12) from fuselage structure and disconnect lead lines from ends of control cable.

(13) Remove control cable (5) in accordance with paragraph 9-113.

(14) Remove bolts, washers, and nuts and remove pulleys (2, 3, 4, 8, 9, 10, 13, 14, and 15) from brackets.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin pulleys with compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion.

NOTE

Replace control cables that are corroded or have three or more broken wires per inch. Replace control cables that have any broken wires if aircraft is to be placed on extended operation in area where replacement cables are not available.

(2) Inspect pulleys for cracks, dents, bends, corrosion, and evidence of misalignment.

(3) Inspect brackets of pulleys for cracks, bends, corrosion, and misalignment.

d. Installation. (1) Position pulleys (2, 3, 4, 8, 9, 10, 13, 14, and 15, figure 9-19) on brackets and install bolts, washers, and nuts.

(2) Install control cable (5) in accordance with paragraph 9-113.

(3) Place center of control cable (12) on cable drum and secure with pin. Wind cable around cable drum the same number of turns noted at time of removal.

(4) Connect lead lines to ends of control cable (12) and pull control cable into position.

(5) Position cable drum on control shaft for control and position indicator assembly and secure with tapered pin, washer, and nut.

(6) Position control wheel on control shaft and secure with bolt, washer, and nut.

(7) Install cable-retaining pins in brackets at pulleys (2, 3, 13, 14, and 15).

(8) Disconnect lead lines from ends of control cable (12). Connect control cable to control cable (5) with turnbuckles (11).

(9) Rig rudder trim tab control system in accordance with paragraph 9-111. Secure turnbuckles (11) with lock wire.

(10) Position cover and hanger fitting on console and secure with screws.

(11) Position knob for aileron trim tab control system on console. Secure with pin and retaining ring.

(12) Install floorboard and carpets in flight compartment and cabin. (Refer to paragraph 4-82 and 4-84 or 4-141 and 4-143.)

(13) Install pilot's and copilot's seats and passenger seat in cabin. (Refer to paragraph 4-57, 4-60, and 4-63; or 4-114 and 4-120.)

(14) Install access panel in aft baggage compartment.

9-117. CONTROL CABLES.(U-8F)

9-118. The control cables for the rudder trim tab control system consist of control cables (4 and 11, figure 9-20). Control cable (4) is connected to rudder trim tab actuator (5) and routed forward around pulleys (3, 7, 8, and 9) to turnbuckles (10). Control cable (11) is connected to cable drum of control and position indicator assembly (1) and routed aft around pulleys (2, 12, 13, and 14) to turnbuckles (10).

a. Removal. (1) Remove carpet and left forward floor web in flight compartment and access cover in cabin floorboard above pulleys (2, figure 9-20). (Refer to paragraphs 4-175 and 4-177.)

(2) Remove access panel from bulkhead in baggage compartment to gain access to turnbuckles (10).

(3) Remove lock wire from turnbuckles (10) and disconnect turnbuckles from ends of control cable (11). Connect lead lines to ends of control cable.

(4) Remove cable retaining pins from brackets at pulleys (2, 12, 13 and 14).

(5) Remove screws and remove access covers from sides and front of pedestal.

(6) Remove bolt, washer, and nut and remove control wheel for control and position indicator assembly from pedestal.

(7) Remove nut on upper end of control wheel shaft and remove control wheel shaft, cable drum gear, cable drum, cable guard, and washer from pedestal.

(8) Pull control cable (11) and cable drum out through front access hole in pedestal and disconnect lead lines.

(9) Remove pin and remove control cable (11) from cable drum.

(10) Remove control cable (4) in accordance with paragraph 9-113, steps (1) through (9).

(11) Remove bolts, washers, and nuts and remove pulleys (2, 3, 7, 8, 9, 12, 13, and 14) from brackets.

b. Cleaning. Clean control cables and pulleys with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

CAUTION

Do not spin pulleys with compressed air.

c. Inspection. (1) Inspect control cables for broken wires, worn spots, and corrosion.

NOTE

Replace control cables that are corroded or have three or more broken wires per inch. Replace control cables that have any broken wires if aircraft is to be placed on extended operation in area where replacement cables are not available.

(2) Inspect pulleys for cracks, dents, bends, corrosion, and evidence of misalignment.

(3) Inspect brackets of pulleys for cracks, bends, corrosion, and misalignment.

d. Installation. (1) Position pulleys (2, 3, 7, 8, 9, 12, 13, and 14, figure 9-20) on brackets and install bolts, washers, and nuts.

(2) Place exact center of control cable (11) on cable drum and secure with pin. Wrap control cable 1-1/2 turns around cable drum in opposite direction.

(3) Connect lead lines to ends of control cable (11) and pull control cable into position on pulleys (2, 12, 13, and 14).

(4) Position washer, cable guard, cable drum, and cable drum gear in pedestal and install control wheel shaft. Secure control wheel shaft with nut.

(5) Position control wheel on control wheel shaft in pedestal and install bolt, washer, and nut.

(6) Install cable-retaining pins in brackets at pulleys (2, 12, 13, and 14).

(7) Install control cable (4) in accordance with paragraph 9-113, and connect to control cable (11) with turnbuckles (10).

(8) Rig rudder trim tab control system in accordance with paragraph 9-111 and secure turnbuckles (10) with lock wire.

(9) Position front and side covers on pedestal and secure with screws.

(10) Install access panel in baggage compartment on bulkhead.

(11) Install access cover on floorboard in cabin above pulley (2) and forward floor web and carpet in flight compartment. (Refer to paragraphs 4-175 and 4-177.)

9-119. CONTROL AND POSITION INDICATOR ASSEMBLY. (U-8D, U-8G, RU-8D)

9-120. The control and position indicator assembly (1, figure 9-19) is located on the console in the flight compartment. The control and position indicator assembly consists of control wheel, cable drum, cable guard, control shaft, and position indicator.

a. Removal. (1) Remove access panel on bulk-

head in aft baggage compartment to gain access to turnbuckles (11, figure 9-19).

(2) Remove lock wire from turnbuckles (11) and disconnect turnbuckles from ends of control cable (12).

(3) Remove retaining ring and pin and remove knob for aileron trim tab control system from console.

(4) Remove screws and remove hanger fitting and cover from console. Slide hanger fitting and cover aft on control column assembly.

(5) Remove bolt, washer, and nut and remove control wheel from control shaft.

(6) Remove tapered pin, washer, and nut and remove control shaft. Remove cable drum and cable guard from console.

(7) Remove pin and remove control cable (12) from cable drum. Note number of turns of control cable on cable drum.

(8) Remove bolt, washer, and nut and remove position indicator from console.

b. Cleaning. Clean control and position indicator assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect control and position indicator assembly for cracks, dents, bends, and corrosion.

d. Repair or replacement. Repair of control and position indicator assembly consists of replacing any worn or damaged parts found during removal and inspection.

e. Installation. (1) Position exact center of control cable (12, figure 9-19) on cable drum and secure with pin. Wrap control cable around cable drum same number of turns noted at time of removal.

(2) Position cable drum and cable guard in console and install control shaft. Secure with tapered pin, washer, and nut.

(3) Place position indicator on console so it reads 0 and mesh gear with gear on control shaft. Secure position indicator on console with bolt, washer, and nut.

(4) Position control wheel on control shaft and secure with bolt, washer, and nut.

(5) Connect aft ends of control cable (12) to turnbuckles (11).

(6) Rig rudder trim tab control system in accordance with paragraph 9-111 and secure turnbuckles (11) with lock wire.

(7) Install access panel on bulkhead in aft baggage compartment.

(8) Position cover and hanger fitting on console and secure with screws.

(9) Position knob for aileron trim tab control system on console and secure with pin and retaining ring.

9-121. CONTROL AND POSITION INDICATOR ASSEMBLY.(U-8F)

9-122. The control and position indicator assembly (1, figure 9-20) is located on pedestal in flight compartment. The control and position indicator assembly consists of a control wheel, control shaft, cable drum, cable guard, cable drum gear, driven gear, and position indicator.

a. Removal. (1) Remove access panel on bulkhead in baggage compartment to gain access to turnbuckles (10, figure 9-20).

(2) Remove lock wire from turnbuckles (10) and disconnect turnbuckles from control cable (11).

(3) Remove pin and retaining ring and remove knob for aileron trim tab control system from pedestal.

(4) Remove edge light panel and side and front access covers from pedestal.

(5) Remove bolt, washer, and nut securing control wheel on control shaft.

(6) Remove nut from upper end of control shaft and remove control shaft, cable drum gear, cable drum, cable guard, washer, and control wheel from pedestal.

(7) Remove pin and remove control cable (11) from cable drum. Note number of turns of control cable on cable drum.

(8) Remove bolt, washer, and nut and remove driven gear from pedestal.

(9) Remove cotter pin, washer, and straight pin and remove position indicator from pedestal.

b. Cleaning. Clean control and position indicator assembly with dry cleaning solvent (item 6, table 1-8) and dry with filtered, compressed air.

c. Inspection. Inspect control and position indicator assembly for cracks, dents, bends, and corrosion.

d. Repair or replacement. Repair of control and position indicator assembly consists of replacing any worn or damaged parts found during removal and inspection.

e. Installation. (1) Position control cable (11,

figure 9-20) on cable drum and secure with pin. Wrap control cable around cable drum same number of turns noted at time of removal.

(2) Position cable drum, cable guard, cable drum gear, washer, and control wheel in pedestal. Install control shaft and secure with nut.

(3) Secure control wheel on control shaft with bolt, washer, and nut.

(4) Position driven gear in pedestal and mesh with gear on cable drum. Secure with bolt, washer, and nut.

(5) Place position indicator on pedestal so it will read 0 and mesh gear with driven gear. Secure with straight pin, washer, and cotter pin.

(6) Connect aft ends of control cable (11) to turnbuckles (10).

(7) Rig rudder trim tab control system in accordance with paragraph 9-111 and secure turnbuckles (10) with lock wire.

(8) Install side and front access covers and edge light panel on pedestal.

(9) Position knob for aileron trim tab control system on pedestal and secure with pin and retaining ring.

(10) Install access panel on bulkhead in baggage compartment.

9-123. ADJUSTING TENSION ON CONTROL CABLES.

9-124. Control cables must be adjusted to the proper tension during rigging of any of the control systems in the aircraft. The following general procedures must be accomplished when adjusting tension on any control cable.

a. Ensure that aircraft structure and control cables are stabilized in temperature at which control cables are to be adjusted.

b. Ensure tensiometer is the correct type for control cable.

c. Vibrate control cables to prevent an incorrect reading due to friction in control system prior to taking reading.

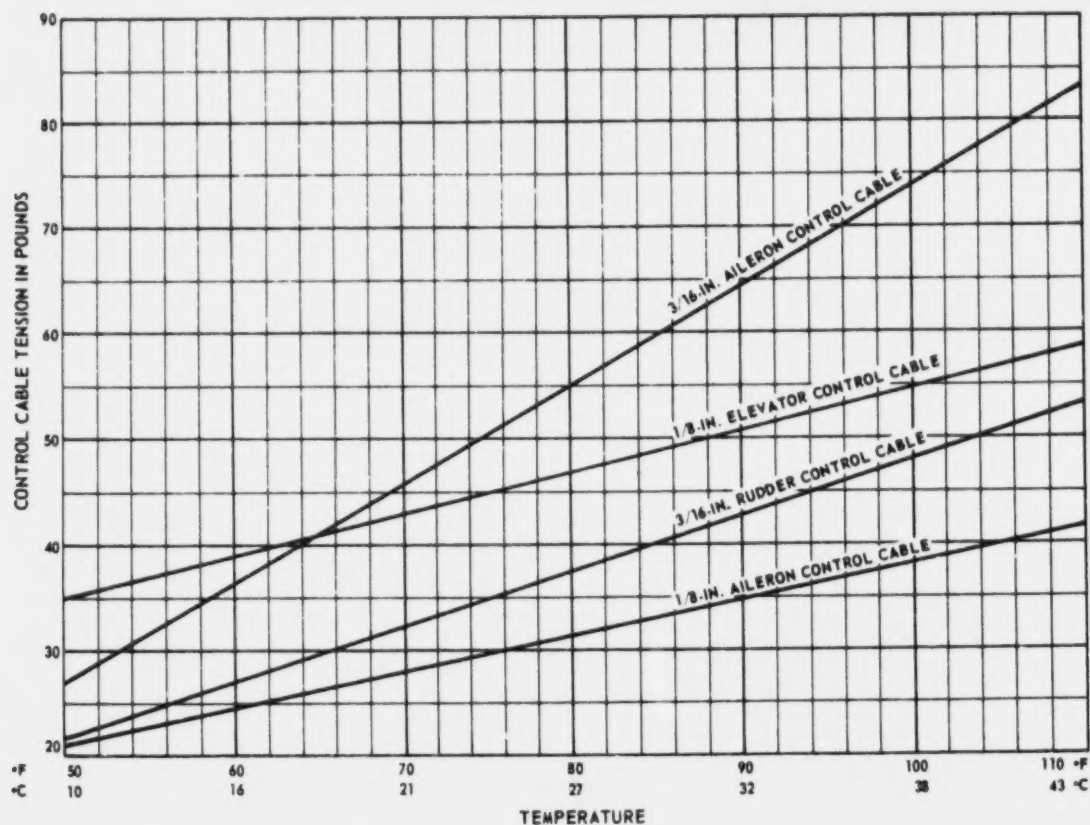


Figure 9-21. Control cable tension compensating chart (U-8D, U-8G, RU-8D)

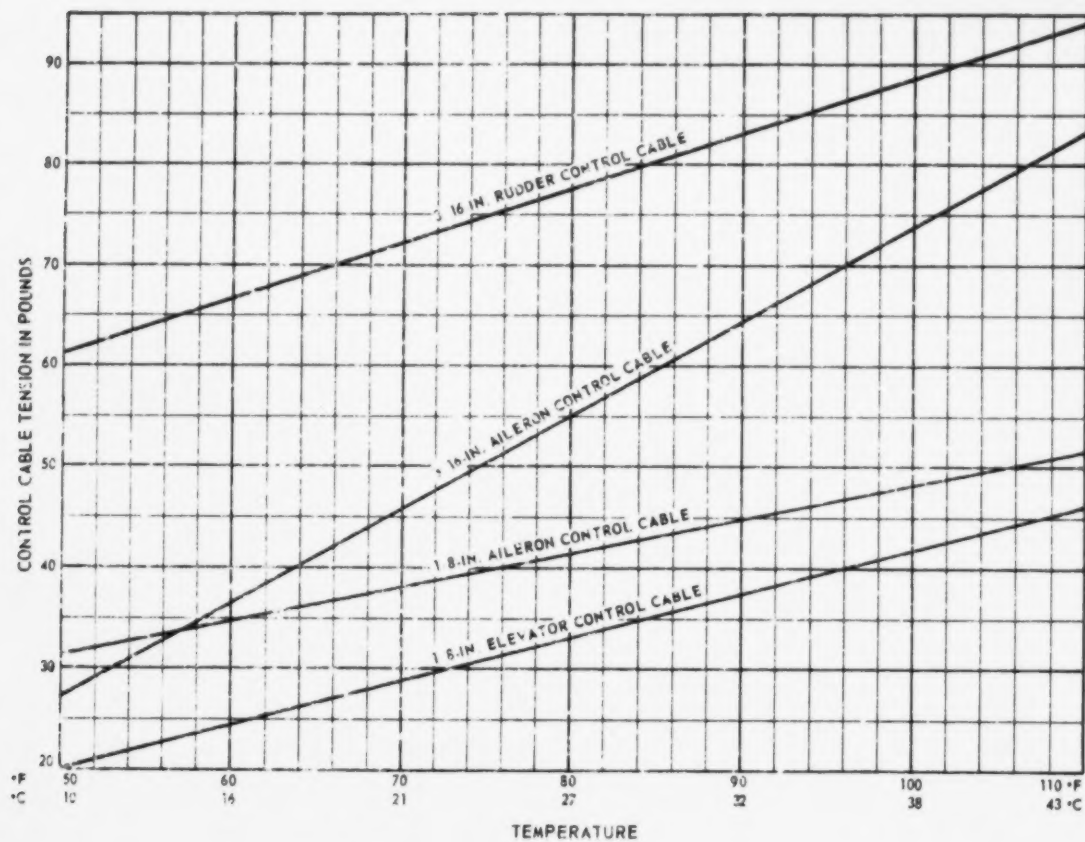


Figure 9-22. Control cable tension compensating chart (U-8F)

CHAPTER 10

INSTRUMENTS

SECTION I SCOPE

10-1. PURPOSE.

10-2. This chapter provides all essential information necessary for organizational maintenance personnel to perform the duties necessary in maintaining instrument systems in the aircraft. Information included provides a brief description of the instrument, troubleshooting information, an operational check utilizing the functions of the aircraft on the ground where possible, and replacement procedures for the components of the instrument system, as designated by the Maintenance Allocation Chart.

10-3. DESCRIPTION.

10-4. Most of the instruments are located forward of the pilot, grouped in standard configuration on the instrument panel (see figures 10-1, 10-1A, 10-2, 10-3, 10-4, and 10-4A). A suction gage used in conjunction with the vacuum system, is mounted on the left side of the instrument panel on U-8D and U-8G aircraft, on the right side of the instrument panel on RU-8D and U-8F (ASAC) aircraft, and on the right side panel next to the copilot on U-8F aircraft. A deicer pressure gage is mounted on the right side of the instrument panel on U-8D, U-8G and RU-8D aircraft, and on the right side panel next to the copilot on U-8F aircraft. The voltammeters, located on the left side of the instrument panel on U-8D (STD) and on the left subpanel on U-8F

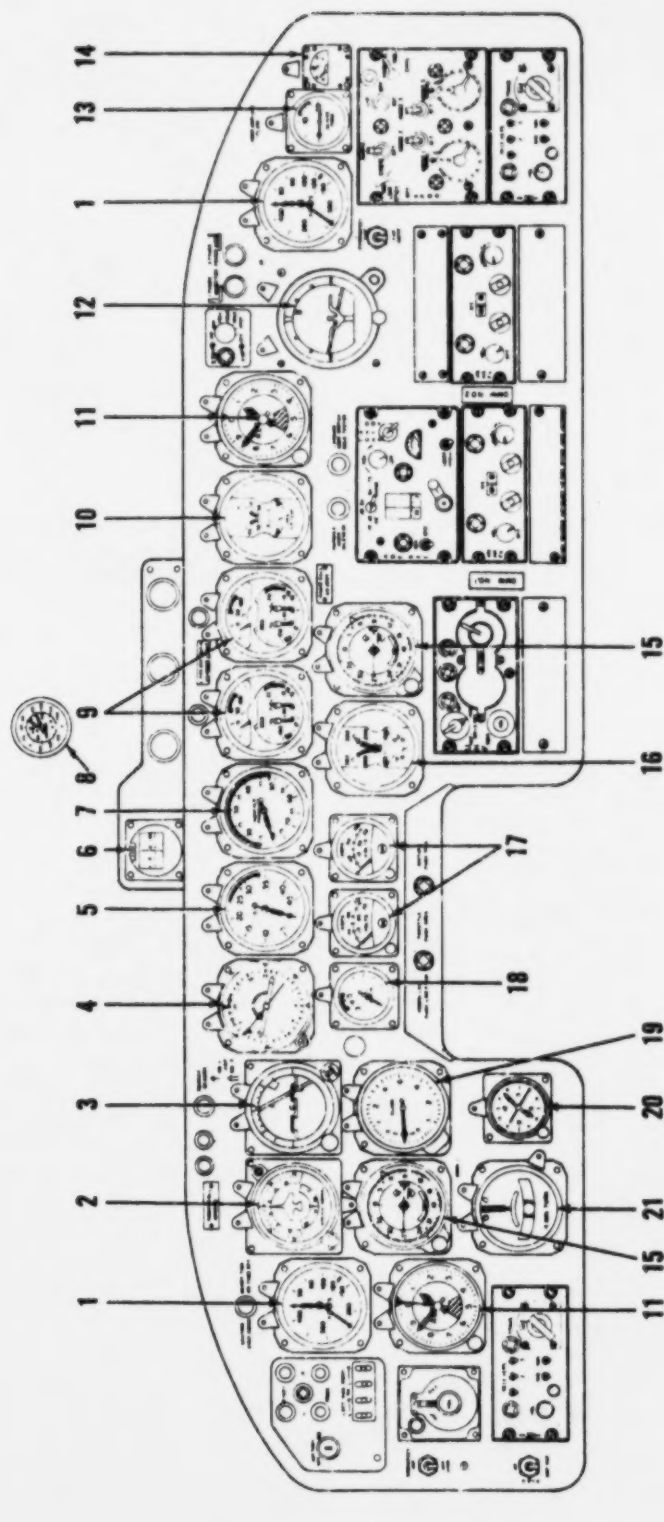
aircraft, are located on the overhead instrument panel on U-8G, RU-8D and U-8D (ASAC) aircraft. The clock is located on the overhead instrument panel on U-8G, RU-8D and U-8D (ASAC) aircraft and on the left side of the instrument panel on U-8D (STD) and U-8F aircraft. The remaining instruments are mounted on the fuel control panel (figures 5-20 and 5-21) and the left subpanel on U-8F aircraft (figure 10-5). Within this chapter the instruments are divided into three groups; flight instruments, navigation instruments, and engine and miscellaneous instruments.

10-5. SPECIAL TOOLS AND EQUIPMENT.

10-6. No special tools or equipment are required for organizational maintenance of the instruments on the U-8 aircraft.

Warning

Some of the instruments contained in this aircraft, may contain radioactive materiel (see TB 55-1500-314-25 for listing). Do not attempt to disassemble these instruments. These items present no radiation hazard to personnel unless seal has been broken due to aging or has accidentally been broken. If seal is suspected to have been broken, do not remove instrument from aircraft until Base Radioactive Protective Officer has been consulted (AR 40-14). A beta-gamma radiac meter AN/PDR-27 or equivalent may be used to determine if the instrument contains the radioactive material (radium).



1. Airspeed indicator
2. Gyrosyn compass indicator
3. Attitude indicator (primary)
4. Radio compass indicator
5. Dual tachometer indicator
6. Magnetic compass

7. Dual manifold pressure gage
8. Outside air temperature gage
9. Engine gage units
10. Dual carburetor air temperature indicator
11. Altimeter

12. Attitude indicator (standby)
13. Deicer pressure gage
14. Propeller anti-icing fluid quantity gage
15. Omni range course indicator
16. Dual cylinder temperature

17. Voltmeters
18. Suction gage
19. Vertical velocity indicator
20. Clock
21. Turn and slip indicator

Figure 10-1. Instrument panel (U-8D)

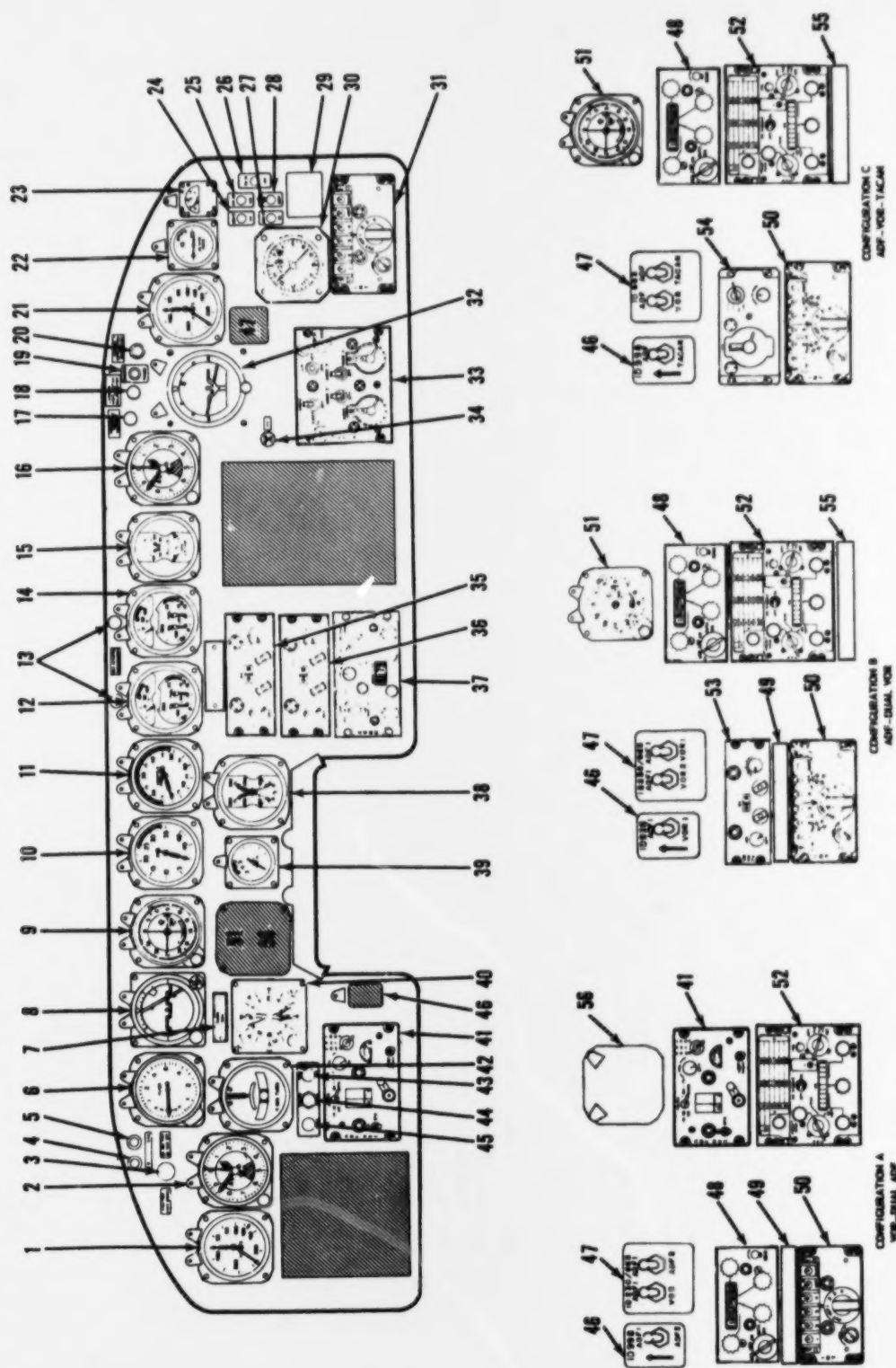
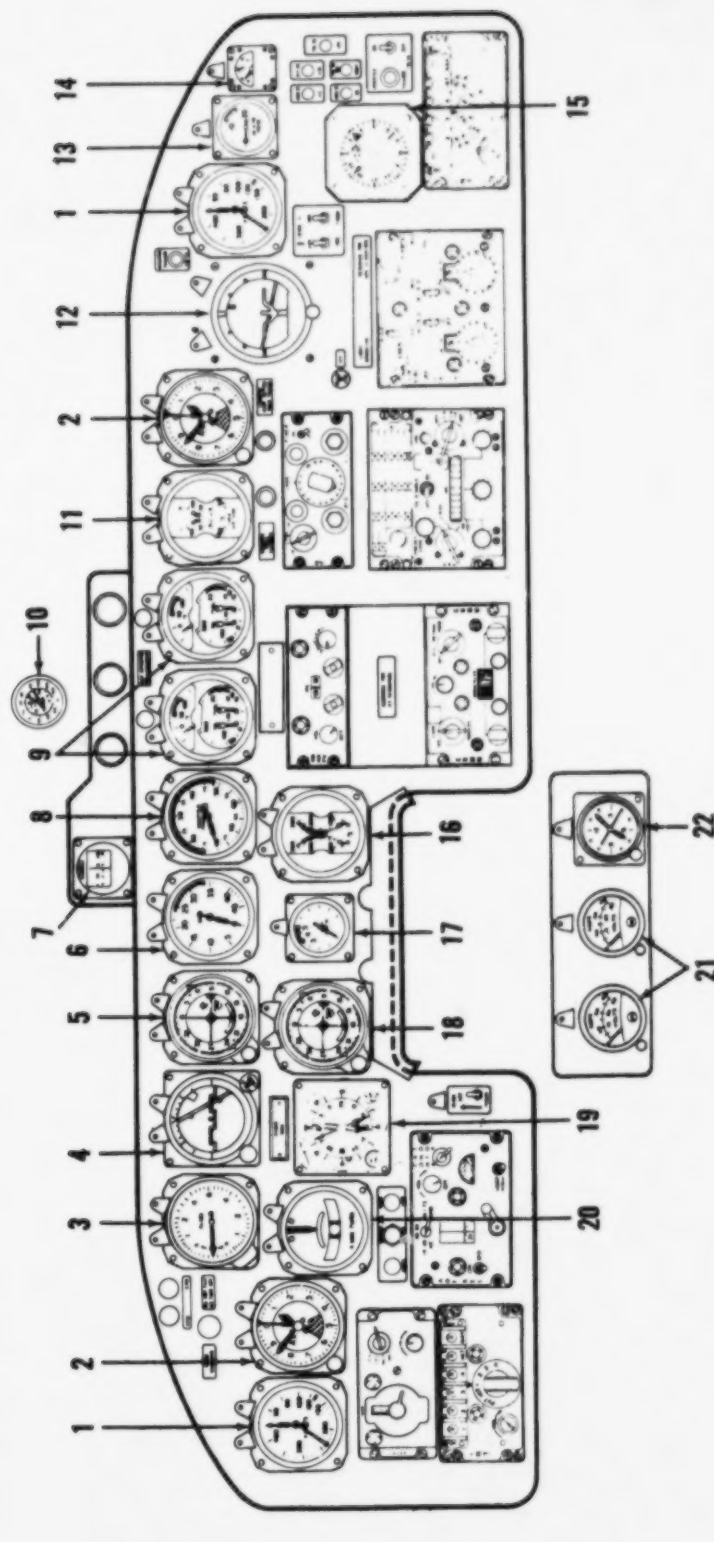


Figure 10-1A. Instrument Panel U-8D (ASAC) (Sheet 1 of 2)

- | | |
|---|--|
| 1. Airspeed indicator | 29. Blank plate |
| 2. Altimeter | 30. Bearing distance heading indicator |
| 3. Cabin step warning light | 31. Interphone control panel |
| 4. B phase fuse holder | 32. Attitude indicator (standby) |
| 5. C phase fuse holder | 33. IFF control panel |
| 6. Vertical velocity indicator | 34. IFF press to test light |
| 7. Radio call number | 35. ARN-30E control panel |
| 8. Attitude indicator (primary) | 36. ARC-134 control panel |
| 9. Course indicator-selector | 37. ARC-54 (or ARC-131) control panel |
| 10. Tachometer | 38. Cylinder head temperature gage |
| 11. Manifold pressure gage | 39. Suction gage |
| 12. Left engine gage unit | 40. Radio magnetic indicator |
| 13. Chip detector warning lights | 41. ARN-59 control panel |
| 14. Right engine gage unit | 42. Turn and slip indicator |
| 15. Carburetor air temperature gage | 43. Marker beacon switch |
| 16. Altimeter | 44. Marker beacon light |
| 17. Warning horn silencer switch | 45. Marker beacon audio |
| 18. HF tune failure light | 46. ID-998 selector switch |
| 19. Inverter failure light | 47. ID250/663 selector switch |
| 20. Landing gear bulb test switch | 48. ARC-102 control panel |
| 21. Airspeed indicator | 49. Dummy panel |
| 22. Deicer pressure gage | 50. C-1611D/AIC control panel |
| 23. Propeller anti-icer fluid gage | 51. Course indicator |
| 24. ARN-52 circuit breaker | 52. ARC-51BX control panel |
| 25. 26 VAC EXC. circuit breaker | 53. ARN-30D control panel |
| 26. 750 VA inverter circuit breaker | 54. ARN-52 control panel |
| 27. ARN-52 D.C. circuit breaker | 55. Blank panel |
| 28. 750 VA inverter cont. circuit breaker | 56. Blank panel |

Figure 10-1A. Instrument panel U-8D (ASAC) (Sheet 2 of 2)



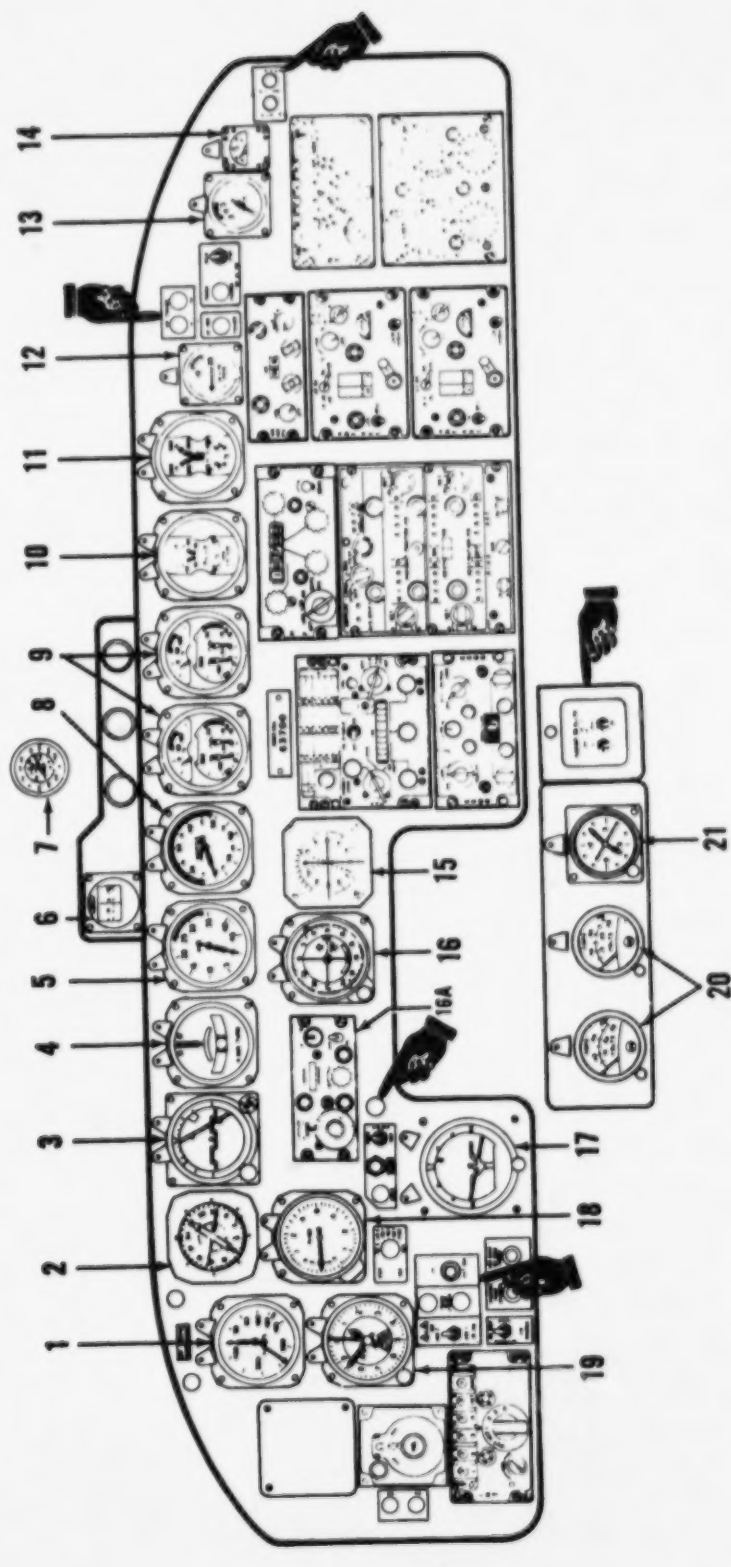
1. Airspeed indicators
2. Altimeters
3. Vertical velocity indicator
4. Attitude indicator (primary)
5. Course indicator-selector (ID-387/ARN)
6. Dual tachometer indicator

7. Magnetic compass
8. Dual manifold pressure gage
9. Engine gage units
10. Outside air temperature gage
11. Dual carburetor air temperature indicator
12. Attitude indicator (standby)

13. Deicer pressure gage
14. Propeller anti-icing fluid quantity gage
15. Bearing-distance-heading indicator (ID-663C/U)
16. Dual cylinder temperature indicator

17. Section gage
18. Course indicator
19. Radio magnetic indicator (ID998/ASN)
20. Turn and slip indicator
21. Voltmeters
22. Clock

Figure 10-2. Instrument panel (U-8G)



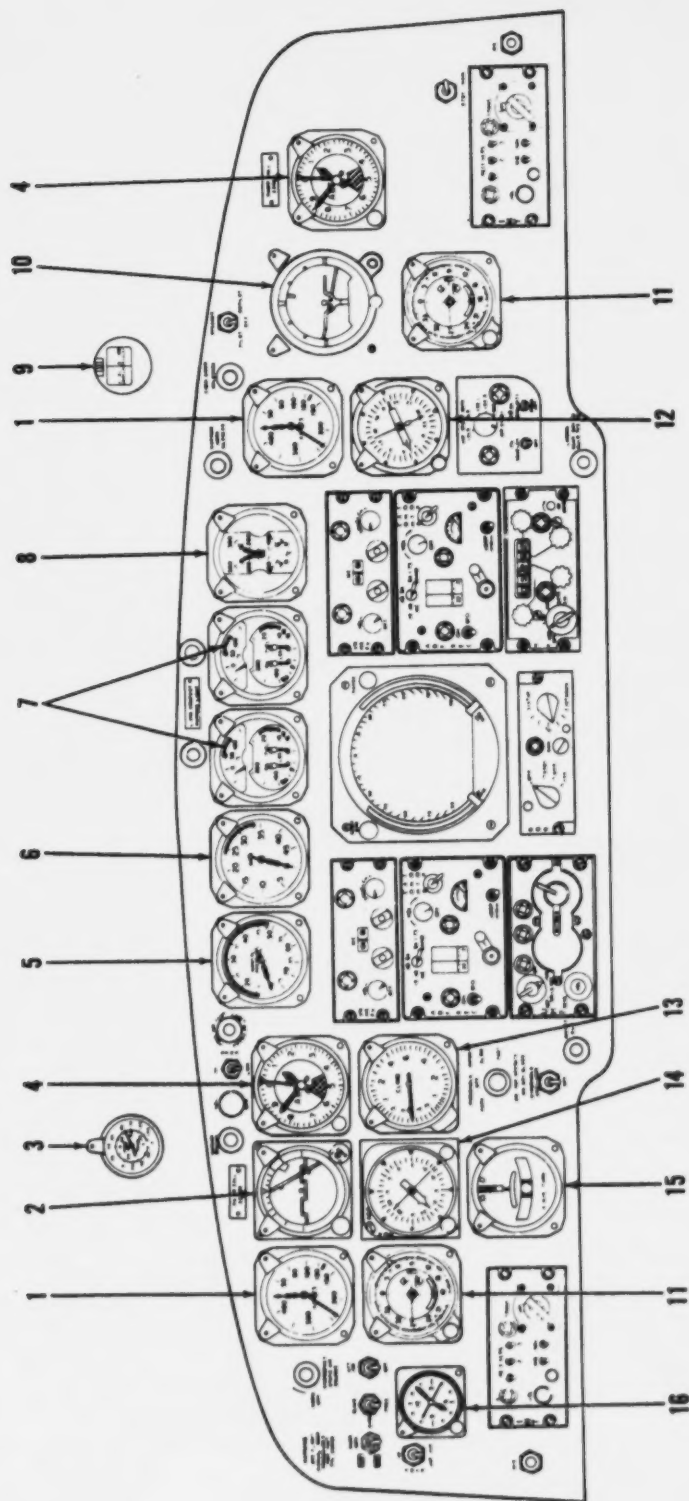
1. Airspeed indicator
2. Radio magnetic indicator
3. Attitude indicator (primary)
4. Turn and slip indicator
5. Dual tachometer indicator
6. Magnetic compass
7. Outside air temperature gage

8. Dual manifold pressure gage
9. Engine gage units
10. Dual carburetor air temperature indicator
11. Dual cylinder temperature indicator
12. Deicer pressure gage

13. Suction gage
14. Propeller anti-icing fluid quantity gage
15. Velocity steering indicator (ID-1282/AVA-3)
16. Course indicator-selector (ID-453/ARN-30)
- 16A. C-12 Compass control

17. Attitude indicator (standby)
18. Vertical velocity indicator
19. Altimeter
20. Voltmeter
21. Clock

Figure 10-3. Instrument panel (RU-8D)



1. Airspeed indicator
2. Attitude indicator (primary)
3. Outside air temperature gage
4. Altimeter
5. Dual manifold pressure gage
6. Dual tachometer indicator
7. Engine gage units
8. Dual cylinder temperature indicator
9. Magnetic compass
10. Attitude indicator (standby)
11. Omni range course indicator
12. Radio compass indicator
13. Vertical velocity indicator
14. Dual ADF indicator
15. Turn and slip indicator
16. Clock

Figure 10-4. Instrument panel (U-8F)

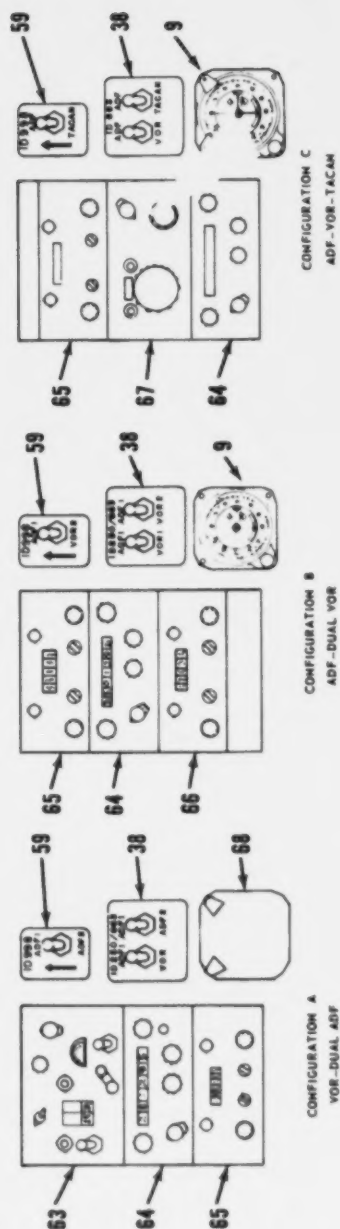
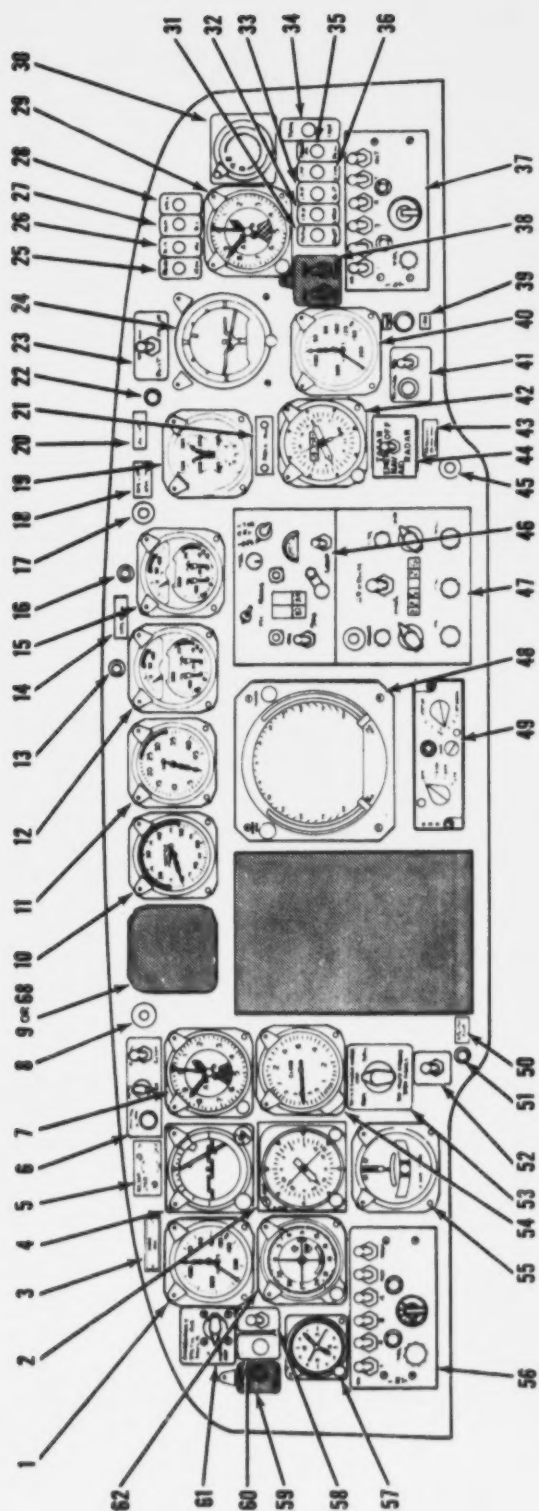
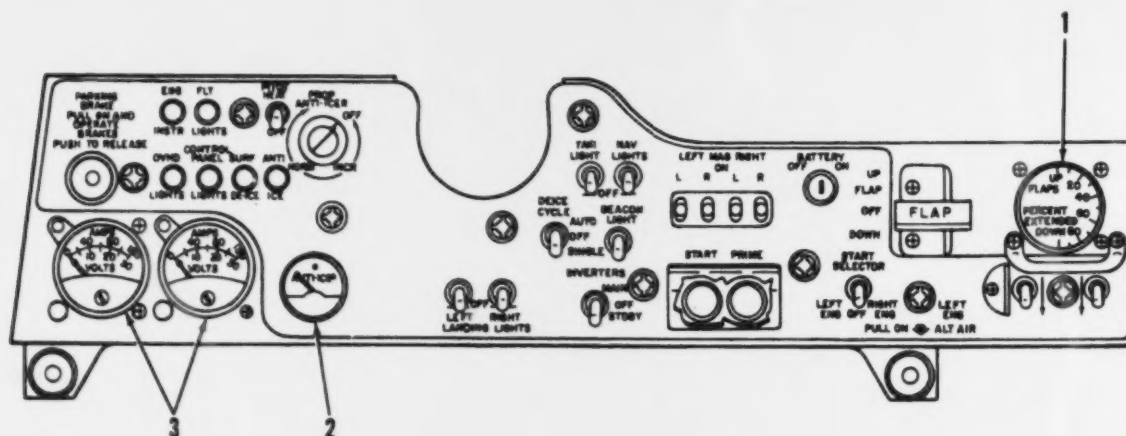


Figure 10-4A. Instrument panel U-8F (ASAC) (Sheet 1 of 2)

- | | |
|---|---|
| 1. Airspeed indicator | 35. 750 VA inverter cont. circuit breaker |
| 2. Radio magnetic indicator | 36. IFF cont. circuit breaker |
| 3. Radio call number placard | 37. Interphone control panel |
| 4. Attitude indicator | 38. ID-250/663 selector switch |
| 5. Radar stab switch | 39. IFF warning light |
| 6. Marker beacon placard | 40. Airspeed indicator |
| 7. Altimeter | 41. Inverter failure warning light and switch |
| 8. Free air temperature light switch | 42. ID-663C/U or ID-250 indicator |
| 9. Course indicator | 43. Landing gear switch bulb tester placard |
| 10. Manifold pressure gage | 44. Emergency nav aid switch |
| 11. Tachometer | 45. Landing gear switch bulb tester |
| 12. Left engine gage unit | 46. ADF control panel |
| 13. Left engine chip detector warning light | 47. UHF control panel |
| 14. Chip detector warning light placard | 48. Radar indicator |
| 15. Right engine gage unit | 49. Radar control panel |
| 16. Right engine chip detector warning light | 50. Inverter out placard |
| 17. Landing gear warning horn silencer button | 51. Inverter failure light (main) |
| 18. Warning horn silencer placard | 52. Windshield anti-icer switch |
| 19. Cylinder head temperature gage | 53. Windshield wiper control |
| 20. Cabin door warning light placard | 54. Vertical velocity indicator |
| 21. Radio call number placard | 55. Turn-and-slip indicator |
| 22. Cabin door warning light | 56. Interphone control panel |
| 23. Pilot copilot cabin speaker selector switch placard | 57. Clock |
| 24. Attitude indicator (standby) | 58. Gyro slave switch |
| 25. 26 VAC excitation circuit breaker | 59. ID-998 selector switch |
| 26. ARN 52 AC circuit breaker | 60. Attitude indicator circuit breaker |
| 27. ARN 52 DC circuit breaker | 61. Emergency static air control |
| 28. KY-28 circuit breaker | 62. Course indicator |
| 29. Altimeter | 63. ARN-59 control |
| 30. Suction gage | 64. ARC-102 control |
| 31. Pilot interphone circuit breaker | 65. ARN-30E control |
| 32. Copilot interphone circuit breaker | 66. ARN-30D control |
| 33. IFF R-T circuit breaker | 67. ARN-52 control |
| 34. 750 VA inverter circuit breaker | 68. Blank panel |

Figure 10-4A. Instrument panel U-8F (ASAC) (Sheet 2 of 2)



1. Wing flap position indicator
2. Propeller anti-icing fluid quantity gage
3. Voltmeters

Figure 10-5. Left subpanel (U-8F)

SECTION II FLIGHT INSTRUMENTS

10-7. DESCRIPTION.

10-8. The flight instruments provide the pilot with information concerning the attitude and environment of the aircraft. The flight instruments include the altimeters, airspeed indicators, and vertical velocity indicator, with their associated pitot-static system. Also included in the flight instruments are the turn and slip indicator, attitude indicators, and the outside air temperature gage.

10-9. ALTIMETERS.

10-10. The altimeters (11, figure 10-1; 2 and 16, figure 10-1A; 2, figure 10-2; 19, figure 10-3; 4, figure 10-4; or 7 and 29, figure 10-4A) located on the flight instrument panel, provide the pilot and copilot with visual indications of the altitude of the aircraft in feet above a reference altitude (usually sea level) under standard conditions of atmospheric pressure and tempera-

ture. In each instrument, the range of the internal mechanisms is 0 to 50,000 feet. Three pointers arranged concentrically indicate altitude in increments of 100, 1000, and 10,000 feet. A small scale, located between the 2 and 3 indexes of the instrument face, is calibrated in inches of mercury. The scale is rotated by a knob at the lower left of the instrument case to equal the ambient barometric pressure. After this adjustment is accomplished, the reading of the actual distance of the aircraft in feet above sea level.

a. Troubleshooting. For troubleshooting procedures for the altimeters, proceed as follows:

CAUTION

The altimeters are connected to the same static line as the airspeed and vertical velocity indicators. Take care when performing maintenance on one instrument not to damage the others.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer does not move	Loose line or hose connections	Tighten line or hose connections.
	Obstruction in lines or hose	Clear lines or hose. (Refer to paragraph 10-15.)
	Defective altimeter	Replace altimeter. (Refer to paragraph 10-9.)
Pointer oscillation	Loose line or hose connections	Tighten line or hose connections.
	Moisture in lines or hose	Clear lines or hose. (Refer to paragraph 10-15.)
	Defective altimeter	Replace altimeter. (Refer to paragraph 10-9.)
	Leak in airspeed or vertical velocity indicator installation	Check airspeed and vertical velocity indicators and hose for leaks. Replace faulty component or tighten connections as required. (Refer to paragraph 10-11 or 10-13.)
Pointer does not set on airport altitude (± 20 feet) on ground with proper barometric setting	Defective altimeter	Notify authorized direct support personnel to inspect altimeter.
	Moisture in lines or hose	Clear lines or hose. (Refer to paragraph 10-15.)
Low reading	Altimeter instrument case leaking	Replace altimeter. (Refer to paragraph 10-9.)
High reading	Improper venting	Clear lines or hose. (Refer to paragraph 10-15.)
No reading	Obstruction in lines or hose	Clear lines or hose. (Refer to paragraph 10-15.)
	Defective altimeter	Replace altimeter. (Refer to paragraph 10-9.)
Excessive pointer oscillation	Defective altimeter	Replace altimeter. (Refer to paragraph 10-9.)
Setting knob binds	Defective altimeter	Replace altimeter. (Refer to paragraph 10-9.)

b. Operational Check. (1) Obtain correct ambient barometric pressure reading corrected to sea level pressure.

(2) Set reading in barometric scale window equal to reading obtained in step a above.

(3) Altimeter reading should equal actual height of aircraft above sea level.

c. Removal. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Remove screws attaching padded glare shield to instrument panel deck and remove

padded glare shield.

(3) Remove retaining screws securing panel to rubber shock mounts.

(4) On U-8F aircraft, disconnect flexible hose and lines at instrument panel bracket assemblies under left and right sides of instrument panel. Provide suitable cover for hose and lines.

(5) Remove lens covers or light shields and instrument lamps.

(6) Pull instrument panel slightly rearward and tilt top aft to gain access to back of instrument panel.

(7) Disconnect hose from tee at rear of altimeter. Remove mounting screws and remove altimeter.

(8) Remove tee from rear of altimeter. Provide suitable cover for opening in altimeter and for hose.

d. Inspection. (1) Inspect altimeter case for excessive dents and glass for cracks.

(2) Inspect fitting at rear of altimeter case for stripped or otherwise damaged threads which would prevent an airtight connection.

(3) Inspect index markings and numerals for legibility. Inspect pointers for cracked or peeling paint.

(4) Inspect glass for security.

e. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Remove cover from hose and rear of altimeter. Coat all male threaded surfaces lightly with antiseize compound (item 45, table 1-8).

CAUTION

Use antiseize compound sparingly and remove all excess to prevent contamination of interior of instrument and lines. Never apply antiseize compound to female threaded surfaces, as any excess will be carried into the interior of the component as the joint is tightened.

(3) Install tee in rear of altimeter case.

(4) Install altimeter in flight instrument panel and secure with mounting screws. Connect hose to tee.

(5) Install instrument lamps and lens cover or light shields.

(6) Raise instrument panel into proper position.

(7) Secure panel to rubber shock mounts with retaining screws.

(8) On U-8F aircraft, connect flexible hose and lines at instrument panel bracket assemblies under left and right sides of instrument panel.

CAUTION

Do not cross-connect pitot and static lines. Check line designations carefully before making the connections.

(9) Install padded glare shield and secure with screws.

10-11. AIRSPEED INDICATORS.

10-12. The airspeed indicators (1, figure 10-1, 10-2, 10-3, and 10-4; 1 and 21, figure 10-1A; 1 and 40, figure 10-4A) denote the speed of the aircraft relative to the air mass through which it is flying. Each instrument is a pressure-sensitive unit actuated by the differential between impact and static air pressures. The impact (pitot) pressure is transmitted from the pitot head to the inside of a pressure-sensitive diaphragm in the instrument case, while static pressure is applied to the interior of the case. Movements of the capsule caused by the resulting pressure difference are converted by mechanical linkage to pointer movement over the calibrated dial. The airspeed indicator face is graduated in knots.

a. Troubleshooting. For troubleshooting procedures for the airspeed indicators, proceed as follows:

CAUTION

The airspeed indicators are connected to the same static line as the altimeters and vertical velocity indicator. Take care when performing maintenance on one instrument not to damage the others.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer does not move	Loose liner or hose connections	Tighten line or hose connections.
	Obstruction in lines or hose	Clear lines or hose. (Refer to paragraph 10-15.)
	Defective airspeed indicator	Replace airspeed indicator. (Refer to paragraph 10-11.)
Pointer oscillation	Loose line or hose connections	Tighten line or hose connections.
	Moisture in lines or hose	Clear lines or hose. (Refer to paragraph 10-15.)
	Defective airspeed indicator	Replace airspeed indicator. (Refer to paragraph 10-11.)
	Leak in altimeter or vertical velocity indicator installation	Check altimeter and vertical velocity indicator and hose for leaks. Replace defective component or tighten connections as required. (Refer to paragraph 10-9 or 10-13.)
Pointer does not set on 0 ($\pm 1/16$ inch) on ground	Defective airspeed indicator	Replace airspeed indicator. (Refer to paragraph 10-11.)
	Moisture in lines or hose	Clear lines or hose. (Refer to paragraph 10-15.)

b. Removal. (1) Perform steps (1) through (6) of paragraph 10-10c.

(2) Disconnect hose from tee and elbow on rear of airspeed indicator.

(3) Remove attaching screws and remove airspeed indicator. Remove tee and elbow at rear of airspeed indicator case.

(4) Provide suitable cover for openings in airspeed indicator case, and for hose.

c. Inspection. (1) Inspect airspeed indicator case for excessive dents and glass for cracks.

(2) Inspect fittings at rear of airspeed indicator case for stripped or otherwise damaged threads which would prevent an airtight connection.

(3) Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

(4) Inspect glass for security and proper range markings. Refer to TM 55-1510-201-10 for prop-

er range markings.

d. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Coat male threaded surfaces of tee and elbow lightly with antiseize compound (item 45, table 1-8).

CAUTION

Use antiseize compound sparingly and remove all excess to prevent contamination of interior of instrument and lines. Never apply antiseize compound to female threaded surfaces, as any excess will be carried into the interior of the component as the joint is tightened.

(3) Remove cover from hose and instrument openings. Install airspeed indicator in rear of instrument panel and secure with screws.

(4) Connect hose to tee and elbow on rear of airspeed indicator.

(5) Perform steps (5) through (9) of paragraph 10-10e.

(6) If required, install instrument range markings on instrument glass as follows:

NOTE

Refer to TM 55-1510-201-10 for proper range markings.

(a) Thoroughly clean instrument glass.

(b) Cut and shape range marking tape to required form.

(c) Apply a thin coat of shellac (item 78, table 1-8) to area of glass where marking is to be applied.

NOTE

The coat of shellac should be slightly wider than the range marking.

(d) Apply range marking to shellac-coated area.

(e) Wipe off any excess shellac.

10-13. VERTICAL VELOCITY INDICATOR.

10-14. The vertical velocity indicator (19, figure 10-1, 6, figure 10-1A; 3, figure 10-2; 18

figure 10-3; 13, figure 10-4; or 54, figure 10-4A), located on the flight instrument panel, indicates the rate of ascent or descent in feet per minute up to 6000 feet per minute. The pointer moves clockwise when indicating ascent and counterclockwise when indicating descent. The vertical velocity indicator incorporates two air-enclosing chambers, a pressure-sensitive diaphragm vented directly to the static line, and the airtight case of the instrument vented to the static line through a thin-walled porcelain capillary tube. Changes in pressure resulting from changes in altitude are transmitted quickly to the inside of the diaphragm and slowly through the capillary tube to the inside of the case. This results in a pressure differential, causing the diaphragm to expand or contract according to the rate of change of altitude. The motion of the diaphragm is transmitted to the pointer. When the aircraft assumes a fixed altitude, the pressures in the diaphragm and case rapidly equalize and the pointer returns to 0. An adjusting screw, located in the lower left corner, is provided for adjusting the zero indication.

a. Troubleshooting. For troubleshooting procedures for the vertical velocity indicator, proceed as follows:

CAUTION

The vertical velocity indicator is connected to the same static line as the altimeters and airspeed indicators. Take care when performing maintenance on one instrument not to damage the others.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer off 0	Mechanism shift	Return pointer to 0 with adjusting screw.
	Deteriorated diaphragm	Replace vertical velocity indicator. (Refer to paragraph 10-13.)
Pointer off 0 and cannot be brought back with adjusting screw	Broken pivot	Replace vertical velocity indicator. (Refer to paragraph 10-13.)
	Defective vertical velocity indicator	Replace vertical velocity indicator. (Refer to paragraph 10-13.)
Pointer fails to respond	Obstruction in lines or hose	Clear lines or hose. (Refer to paragraph 10-15.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Instrument indicates less actual vertical velocity	Leak in lines or hose	Repair or replace lines or hose as required. (Refer to paragraph 10-15.)
	Defective vertical velocity indicator	Replace vertical velocity indicator. (Refer to paragraph 10-13.)
Pointer oscillates	Leak in lines or hose	Repair or replace lines or hose as required. (Refer to paragraph 10-15.)
	Defective vertical velocity indicator	Replace vertical velocity indicator. (Refer to paragraph 10-13.)

b. Removal. (1) Perform steps (1) through (6) of paragraph 10-10c.

(2) Disconnect hose from tee at rear of vertical velocity indicator.

(3) Remove attaching screws and remove vertical velocity indicator.

(4) Remove tee from rear of vertical velocity indicator and provide suitable cover for hose and instrument opening.

c. Inspection. (1) Inspect vertical velocity indicator case for excessive dents and glass for cracks.

(2) Inspect fitting at rear of vertical velocity indicator case for stripped or otherwise damaged threads which would prevent an airtight connection.

(3) Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

d. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Coat male threaded surfaces of elbow with antiseize compound (item 45, table 1-8).

CAUTION

Use antiseize compound sparingly and remove all excess to prevent contamination of interior of instrument and lines. Never apply antiseize compound to female threaded surfaces, as any excess will be carried into the interior of the component as the joint is tightened.

(3) Remove cover from hose and instrument opening. Install tee in opening. Install tee in

opening at rear of vertical velocity indicator.

(4) Install vertical velocity indicator in rear of flight instrument panel and secure with attaching screws. Install hose to tee.

(5) Perform steps (5) through (9) of paragraph 10e.

e. Adjustment. With all aircraft systems inoperative, set vertical velocity indicator pointer to 0 (nine O'clock position) by means of adjusting screw at lower left of instrument face.

10-15. PITOT-STATIC SYSTEM.

10-16. (See figures 10-6 and 10-7) An electrically heated pitot head is installed in the forward end of a mast projecting from the leading edge of the left-hand wing from which ram (pitot) pressure is supplied by rigid and flexible tubing to the airspeed indicator on the flight instrument panel. The pitot head embodies pitot line and pipeline fittings to carry pitot pressure from the orifice to a connecting pipeline in the wing leading edge, and a heating element to provide for pitot anti-icing. Four screws secure the pitot head to its mast. An electrical cable supplies the 75-watt heating element in the pitot head with 28 volts dc, and is controlled by a circuit breaker switch on the electrical switch panel. An independent static system derives static pressure from a static port in each side of the rear fuselage. These are connected by similar tubing to the airspeed indicators, the altimeters, and the vertical velocity indicators. Drain traps are installed in the pitot and static lines to allow accumulated moisture to be removed. An access door, located in the lower leading edge of the center section wing, permits easy access to the pitot

line drain cock. On U-8D, U-8G, and RU-8D, aircraft, the static line drain cock is located in the baggage compartment on the left side. On U-8F aircraft, the static line drain cock is

located beside the copilot's seat.

a. Troubleshooting. For troubleshooting procedures for the pitot-static system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Fixed reading on airspeed indicator	Ice or water in pressure lines	Thaw out; clear and dry lines and traps. (Refer to paragraph 10-15.)
Erratic readings on pitot-static instruments	Leak in static line	Notify direct support maintenance unit.
	Ice or water in pressure lines	Thaw out; clear and dry lines and traps. (Refer to paragraph 10-15.)

b. Removal. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

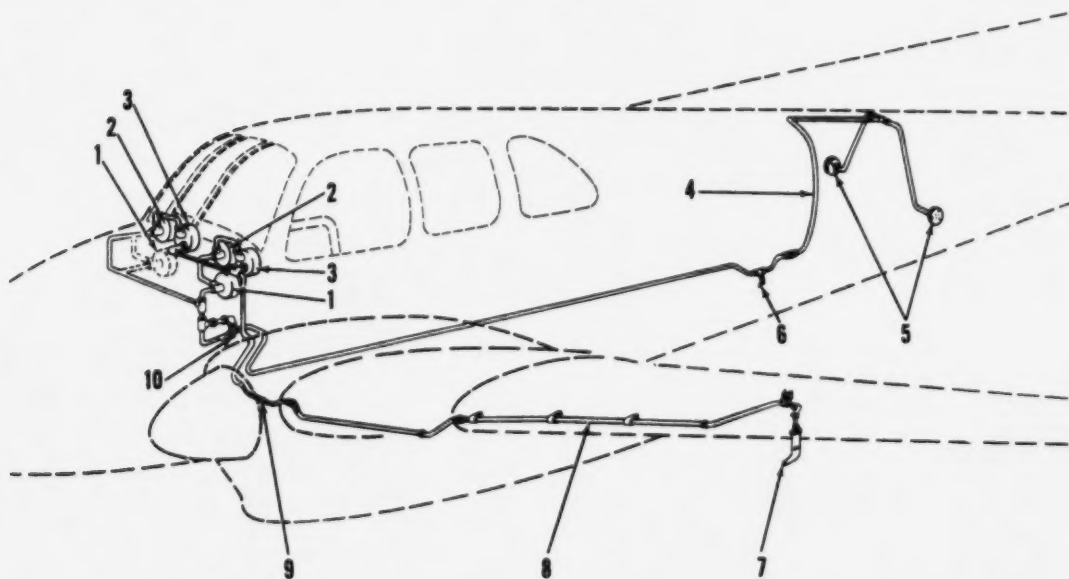
(2) Remove screws securing the pitot mast

to underside of left wing.

(3) Pull pitot mast down from wing enough to gain access to pitot line and electrical lead.

(4) Disconnect electrical lead and pitot line.

(5) Remove screws securing pitot head to mast and separate mast and head.



1. Vertical velocity indicator
2. Altimeter
3. Airspeed indicator
4. Static line

5. Static ports
6. Static line drain cock
7. Pitot head and mast

8. Pitot line
9. Pitot line drain cock
10. Alternate static air source

Figure 10-6. Pitot-static system (U-8D, U-8G and RU-8D)

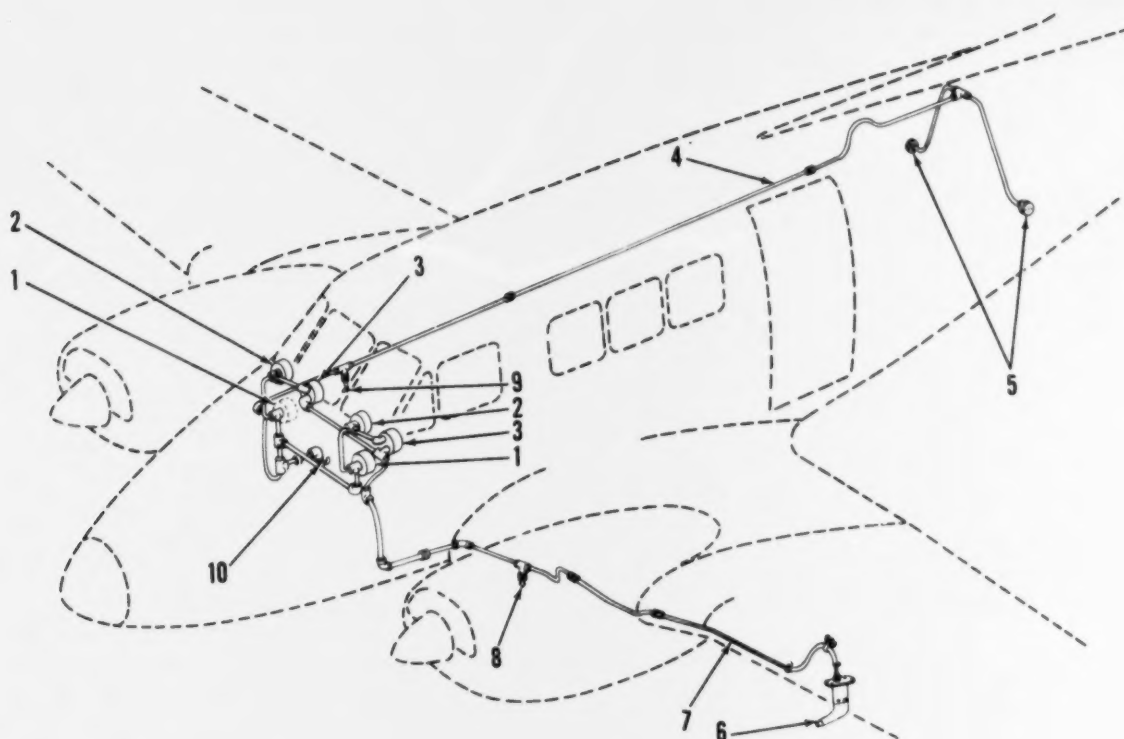


Figure 10-7. Pitot-static system (U-8F)

NOTE

The remainder of the pitot-static system is removed only as required to replace a defective component. Removal of an individual line or hose segment is accomplished by disconnecting fittings at both ends, removing clamps, and removing desired segment. Replacement of static ports and line segments within wing is not within the capabilities of organizational maintenance.

c. Inspection. (1) Inspect hose for stiffness, cracks, and peeling. Inspect lines for dents and nicks.

(2) Inspect fittings and other threaded components for stripped threads and other damage which would prevent an airtight connection.

(3) Inspect pitot head openings and passages for entrapped foreign matter. Inspect electrical connectors for corrosion, arcing, proper contact, and damage.

(4) Inspect static openings in sides of aircraft for foreign matter.

d. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

NOTE

As components of the pitot-static system are reinstalled, observe P and S markings and install each component in its proper part of the system.

(2) Coat male threaded surfaces of components lightly with antiseize compound (item 45, table 1-8).

CAUTION

Use antiseize compound sparingly and remove all excess to prevent contamination of interior of lines. Never apply antiseize compound to female threaded surfaces, as any excess will be carried into the interior of the components as the joint is tightened.

NOTE

Connect any line or hose segments removed at fittings and secure with clamps.

(3) Position pitot head in mast and secure with screws.

(4) Connect pitot line heater lead to pitot mast.

(5) Position mast on wing and install retaining screws.

c. Servicing. (1) Cover pitot head with suitable cover when aircraft is on the ground to prevent the entry of dirt, insects, or other foreign matter.

(2) Remove cover and make sure all openings in pitot head are free of foreign matter before takeoff.

(3) Periodically drain accumulated moisture at static and pitot line drain cocks (6 and 9, figure 10-6, or 9 and 8, figure 10-7).

(4) Clear obstructions from pitot or static lines, if required as follows:

(a) Perform steps (1) through (6) of paragraph 10-10c.

(b) Disconnect all flexible hose from airspeed indicators, altimeters, and vertical velocity indicator. Cover all instrument openings.

(c) Inspect interconnecting hose removed in step (b) above for obstructions.

(d) Connect a pressure source to end of pitot pressure line at instrument panel disconnect. Apply up to 10 psi pressure of filtered, dry air until reasonably certain that all moisture and foreign matter has been removed. Repeat procedure at static line.

(e) Remove covers from instruments and in-

stall flexible hose to rear of airspeed indicators, altimeters, and vertical velocity indicator.

(f) Perform steps (5) through (9) of paragraph 10-10e.

10-17. TURN AND SLIP INDICATOR.

10-18. The turn and slip indicator (21, figure 10-1; 42, figure 10-1A; 20, figure 10-2; 4, figure 10-3; 15, figure 10-4; or 55, figure 10-4A), is a hermetically sealed, direct-reading instrument, comprising a speed-governed, electrically driven gyro linked to a mechanical pointer, and an inclinometer consisting of a glass ball, free to move, in a short, curved, liquid-filled glass tube. The direction and rate of turn of the aircraft are indicated by the pointer deviating to either the left or right of a fixed center reference point; the amount of deviation being proportional to the rate of turn. The inclinometer provides an indication of the lateral stability of the aircraft in both straight flight and turn. In straight flight, the inclinometer ball occupies the center position of its glass tube due to the force of gravity, in a perfectly banked turn, the ball remains in the centered position consistent with the added influence of proportional centrifugal force. Excessive or insufficient bank causes the ball to roll to the left or right of the center position accordingly, indicating aircraft slip or skid. The turn and slip indicator is supplied with 28 volts dc from the aircraft bus.

a. Troubleshooting. For troubleshooting procedures for the turn and slip indicator, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Gyro does not operate.	Poor electrical connections.	Inspect disconnect plug and external wiring for loose or corroded connections. Clean and tighten connections.
	Worn brushes in turn and slip indicator or weak brush springs.	Replace turn and slip indicator (Refer to paragraph 10-17.)
	Low input voltage.	Refer to paragraph 12-15 and check dc power system.
Intermittent gyro operation.	Poor electrical connections.	Inspect disconnect plug and external wiring for loose or corroded connections. Clean and tighten connections.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
	Worn brushes, weak brush springs, or intermittent contact in turn and slip indicator.	Replace turn and slip indicator. (Refer to paragraph 10-17.)
Radio interference during gyro operation.	Poor electrical connections.	Inspect disconnect plug and external wiring for loose or corroded connections. Clean and tighten connections.
	Weak brush spring, worn brushes, or intermittent contact in turn and slip indicator housing.	Replace turn and slip indicator. (Refer to paragraph 10-17.)
	Defective filter	Replace turn and slip indicator. (Refer to paragraph 10-17.)
Gyro operating; pointer fails to respond.	Defect in linkage to gyro.	Replace turn and slip indicator. (Refer to paragraph 10-17.)
Excessive pointer vibration.	Loose mounting screws.	Tighten mounting screws.
	Defective linkage in turn and slip indicator.	Replace turn and slip indicator. (Refer to paragraph 10-17.)
Sluggish indications at low temperatures	Thickening of lubricant.	Replace turn and slip indicator. (Refer to paragraph 10-17.)
Incorrect sensitivity	Defective turn and slip indicator.	Replace turn and slip indicator. (Refer to paragraph 10-17.)

b. Removal. (1) Perform steps (1) through (6) of paragraph 10-10c.

(2) Remove disconnect plug from rear of turn and slip indicator.

(3) Remove mounting screws and remove turn and slip indicator.

c. Inspection. (1) Inspect turn and slip indicator case for excessive dents and glass for cracks.

(2) Inspect electrical connector at rear of turn and slip indicator case for bent pins, thread damage, corrosion, and signs of arcing.

(3) With turn and slip indicator in normal operating position, observe inclinometer for visible bubbles. Tilt inclinometer to each side and observe glass ball for restricted movement and sticking of glass ball at either end of tube.

NOTE

Make sure that DC ELECT is painted on instrument face or directly below mounting on instrument panel.

d. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Install turn and slip indicator in rear of flight instrument panel and secure with attaching screws. Install disconnect plug at rear of turn and slip indicator.

(3) Perform steps (5) through (9) of paragraph 10-10e.

10-19. ATTITUDE INDICATOR (PRIMARY), (U-8D,U-8G,RU-8D)

10-20. The J-8 primary attitude indicator (3, figure 10-1; 8, figure 10-1A; 4, figure 10-2; or 3, figure 10-3) provides an artificial horizon for the pilot, portraying a picture of the attitude of the aircraft, and thus establishing a reference plane parallel to the natural horizon. A fixed symbol in front of the face represents the horizon. The aircraft symbol may be adjusted vertically by means of the knob on the lower left corner of the instrument. This knob is provided to correct for variations in level flight at differing airspeeds and gross weights. The primary attitude indicator can be caged to avoid tumbling of the gyro by manually pulling out the PULL TO CAGE knob located at the lower right corner of the indicator. The attitude indicator is powered by alternating current furnished by

either the MAIN or STANDBY, inverters. A two-position toggle switch, located on the right sub-panel adjacent to the inverter switch operates the indicator. Placing the switch in ON position with the inverters operating, completes the circuit to the indicator. The attitude indicator is protected from electrical overloads by two 1/2 ampere fuses. These fuses are located on the upper left of the instrument panel.

NOTE

The OFF flag is not an indication of instrument malfunction, but is merely a signal to notify the pilot that the instrument is not receiving adequate power.

a. Troubleshooting. For troubleshooting procedures for the attitude indicator, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Gyro does not operate	Poor electrical connections	Check plug and external wiring for loose connections.
	Phase A or phase C voltage missing	Check fuses and inverter.
	Low input voltage to generators	Check battery. If output is low, replace battery. (Refer to paragraph 12-167.)
Intermittent gyro operation	Poor electrical connections	Check plug and external wiring for breaks and loose connections.
	Intermittent contact in housing	Replace attitude indicator. (Refer to paragraph 10-19.)
Radio interference	Poor electrical connections	Check plug and external wiring for loose connections.
	Intermittent contact in housing	Replace attitude indicator. (Refer to paragraphs 10-19.)
Gyro does not respond readily to changes in attitude	Contact with front glass or binding in mounting	Replace attitude indicator. (Refer to paragraph 10-19.)
Vibration	Improper damping in instrument	Replace attitude indicator. (Refer to paragraphs 10-19.)

b. Removal (1) Perform steps (1) through (6) of paragraph 10-10c.

(2) Operate PULL TO CAGE knob at lower right of instrument face until CAGED flag appears. Secure knob in caged position with a suitable clip.

CAUTION

The PULL TO CAGE knob should be drawn out smoothly. A violent or hard pull may damage the instrument.

(3) Remove disconnect plug from rear of instrument case.

(4) Remove mounting screws and remove attitude indicator.

c. Inspection. (1) Inspect attitude indicator case for excessive dents and glass for cracks.

(2) Inspect connector at rear of attitude indicator case for stripped threads and loose or corroded pins.

(3) Inspect horizon line, index lines, and pointers for legibility and cracked or peeling paint.

(4) Make sure caging mechanism locks gyro securely when actuated. Make sure caging knob operates freely.

d. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Install attitude indicator in instrument panel and secure with mounting screws.

(3) Install disconnect plug at rear of attitude indicator.

(4) Perform steps (5) through (9) of paragraph 10-10e.

(5) Remove clip from PULL TO CAGE knob.

10-21. ATTITUDE INDICATOR (PRIMARY) (U-8F)

10-22. The MM-3A primary attitude indicator (2, figure 10-4 or 4, 10-4A) is incorporated on U-8F aircraft serial No. 61-2426 and subsequent. The indicator provides the pilot with constant visual indication of the lateral and longitudinal attitude of the aircraft. A symbol fixed to the face of the indicator represents the aircraft. A moving spheroid background, finished in 2 colors with a distinct horizontal line dividing the colors, represents the horizon. The rate gyro in the system slaves the indicator to the roll and pitch displacement gyro to give an indication of aircraft attitude. The rate gyro also prevents damage to the system during extreme maneuvers. The system is powered by alternating current furnished by either of the AC inverters. A two-position toggle-type circuit breaker switch, located on the upper left side of the instrument panel, controls the system.

a. Troubleshooting. For troubleshooting procedures for the attitude indicator, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Gyro does not operate.	Poor electrical connections	Check plug and external wiring for loose connections.
	Phase A or phase C voltage missing.	Check breaker switch and inverter output.
	Low input voltage to generators.	Check battery. If output is low, replace battery.
Intermittent gyro operation	Poor electrical connections.	Check plug and external wiring for breaks and loose connections.
	Intermittent contact in housing.	Replace indicator. (Refer to paragraph 10-21.)
Radio interference.	Poor electrical connections.	Check plug and external wiring for loose connections.
	Intermittent contact in housing.	Replace indicator. (Refer to paragraph 10-21.)
Indicator does not respond readily to changes in attitude.	Contact with front glass or binding in mounting.	Replace indicator. (Refer to paragraph 10-21.)
Vibration.	Improper damping in instrument.	Replace indicator. (Refer to paragraph 10-21.)

b. Removal. (1) Perform steps (1) through (6) of paragraph 10-10c.

(2) Operate PULL TO CAGE knob at lower right of instrument face until CAGED flag appears. Secure knob in CAGED position with a suitable clip.

CAUTION

The PULL TO CAGE knob should be drawn out smoothly. A violent or hard pull may damage the instrument.

(3) Remove disconnect plug from rear of instrument case.

(4) Remove mounting screws and remove attitude indicator.

c. Inspection. (1) Inspect attitude indicator case for excessive dents and glass for cracks.

(2) Inspect connector at rear of attitude indicator case for stripped or otherwise damaged threads and loose, corroded, or otherwise damaged pins.

(3) Inspect horizon line, index lines, and pointers for legibility and cracked or peeling paint.

(4) Make sure caging mechanism locks gyro securely when actuated. Make sure caging knob operates freely.

d. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Install attitude indicator in instrument panel and secure with mounting screws.

(3) Install disconnect plug at rear of attitude indicator.

(4) Perform steps (5) through (9) of paragraph 10-10e.

(5) Remove clip from PULL TO CAGE knob.

10-23. ATTITUDE INDICATOR (STANDBY).

10-24. The standby attitude indicator (12, figure 10-1; 32, figure 10-1A; 12, figure 10-2; 17, figure 10-3; 10, figure 10-4; or 24, figure 10-4A) is a gyroscopic instrument providing visual indication of the lateral and longitudinal attitude of the aircraft. The instrument is provided with a miniature aircraft, horizon bar, bank indicator, and bank scale, visible on the dial. The miniature aircraft assumes the same position relative to the horizon bar as the aircraft does to the natural horizon. The bank scale provides an indication of the degree of bank. An adjusting knob, centrally located below the dial of the indicator, provides for realignment of the miniature aircraft with the horizon bar under varying aircraft load conditions. To render the indicator inoperative and safe during excessive aerial maneuvers or during handling, a caging knob is incorporated which, when turned, holds the instrument mechanism in a fixed position. A red warning signal appears on the instrument gage when the gyro is caged.

a. Troubleshooting. For troubleshooting procedures for the attitude indicator, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Gyro does not start or fails to get up speed.	Loose hose connection	Tighten hose connection
	Incorrect vacuum pressure	Adjust suction relief valve. (Refer to paragraphs 11-89 or 11-90.)
		Replace suction relief valve. (Refer to paragraphs 11-89 or 11-90.)
		Replace vacuum pump. (Refer to paragraph 11-87.)
Noisy operation	Defective attitude indicator	Replace attitude indicator. (Refer to paragraph 10-23.)
	Defective bearings	Replace attitude indicator. (Refer to paragraph 10-23.)

b. Removal. (1) Perform steps (1) through (6) of paragraph 10-10c.

(2) Operate PULL TO CAGE knob at lower right of instrument face until CAGED flag appears.

(3) Remove vacuum hose from elbow and tee at rear of attitude indicator.

(4) Remove mounting screws and remove attitude indicator. Remove elbow and tee from rear of attitude indicator and provide suitable cover for hose and instrument openings to prevent contamination. Secure hose.

NOTE

The attitude indicator uses a metal clip to hold the instrument in a permanently uncaged position while in the aircraft. When removing an attitude indicator for replacement, remove this metal clip for use on replacement model. If metal clip is not adaptable to replacement model, fabricate a part similar to original clip and install on replacement model. On Instrument Panels where Attitude Indicators (Vac) are installed without Caging Knob Assemblies, uncage Attitude Indicator, remove the two screws holding the Caging Assembly to the Indicator and install Caging Assembly on old Indicator being removed.

c. Inspection. (1) Inspect attitude indicator case for excessive dents and glass for cracks.

(2) Inspect fittings at rear of attitude indicator case for stripped or otherwise damaged threads which would prevent an airtight connection.

(3) Inspect horizon line, index lines, and pointers for legibility and cracked or peeling paint.

(4) Make sure caging mechanism locks gyro securely when actuated. Make sure caging knob operates freely.

d. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Coat male threaded surfaces of elbow and tee with antiseize compound (item 45, table 1-8).

CAUTION

Use antiseize compound sparingly and remove all excess to prevent contamination of interior of instrument and lines. Never apply antiseize compound to female threaded surfaces, as any excess will be carried into the interior of the components as the joint is tightened.

(3) Remove cover from hose and instrument openings. Install elbow and tee in openings at rear of attitude indicator.

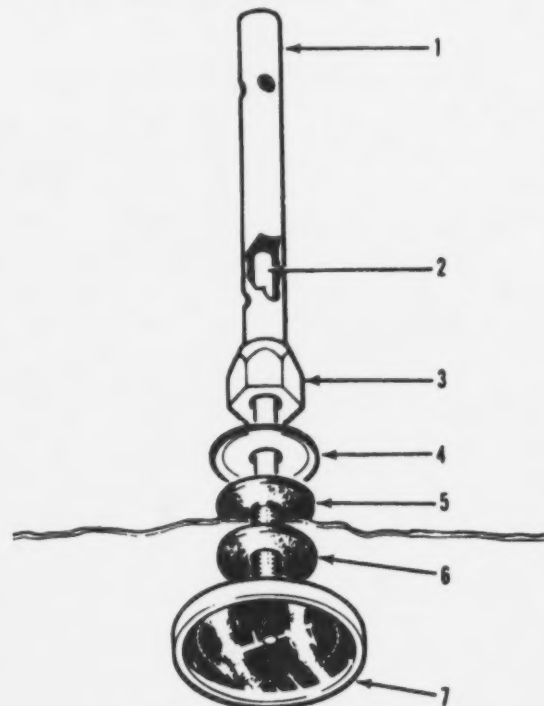
(4) Install attitude indicator in rear of flight instrument panel and secure with attaching screws. Install vacuum hose to elbow and tee.

(5) Perform steps (5) through (9) of paragraph 10-10e.

(6) Remove clip from PULL TO CAGE knob.

10-25. OUTSIDE AIR TEMPERATURE GAGE.

10-26. The outside air temperature gage (8, figure 10-1; 10, figure 10-2; 7, figure 10-3; or 3, figure 10-4) is installed in the flight compartment roof, with the stem (2, figure 10-8) of the instrument protruding through to the outside air and the thermometer dial (7) on the inside of the roof. The instrument consists of a bimetal element to which is attached a staff and pointer; a hollow stainless steel stem encloses the element. A brass sunshield (1) is installed over the stem (2). The pointer registers on a dial calibrated in degrees centigrade and Fahrenheit, ranging from -50° to $\pm 60^{\circ}$ (-58° to $\pm 140^{\circ}$ F). Pointer movement is obtained by the



- | | |
|------------------|---------------------------------|
| 1. Sunshield | 5. Outer rubber mounting washer |
| 2. Stem | 6. Inner rubber mounting washer |
| 3. Cone nut | 7. Thermometer dial |
| 4. Dished washer | |

Figure 10-8. Outside air temperature gage

reaction of the bimetal element to change in temperature. The element is a small helical spring comprised of a wound strip of two dissimilar alloys welded together. These alloys have different coefficients of expansion which cause the spring to coil more tightly, or uncoil, when subjected to a change in temperature. The pointer, being attached to the element by the staff, rotates accordingly, registering the element's reaction on the instrument dial in degrees centigrade.

a. Troubleshooting. As the outside air temperature gage consists of a self-contained unit, substitution of a gage of known quality for a suspected gage is the only feasible means of troubleshooting.

b. Removal. (1) On outside of aircraft, loosen cone nut (3, figure 10-8) on sunshield (1) and remove from stem (2).

CAUTION

If only one man is available for removal operation, tape gage dial to roof to eliminate the possibility of damage caused by instrument falling when outside hardware is removed.

(2) Remove dished washer (4) and outer rubber mounting washer (5).

(3) In flight compartment, remove thermometer dial (7) and inner rubber mounting washer (6), taking care to prevent damage to stem (2).

c. Inspection. (1) Inspect sunshield for dents, plugged openings, and misalignment which would allow contact with stem (2) when installed.

(2) Inspect cone nut and base of stem for stripped or otherwise damaged threads.

(3) Inspect dished washer for deep scoring and distortion. Inspect rubber mounting washers for peeling, cracking, and resiliency.

(4) Inspect thermometer dial case for dents and glass for cracks.

(5) Inspect index markings and numerals for legibility. Inspect pointer for chipped or peeling paint.

d. Installation. (1) Install inner rubber mounting washer (6, figure 10-8), and install stem

(2) through hole in cabin roof so that back of thermometer dial (7) is flush with flight compartment ceiling.

(2) On outside of aircraft, install outer rubber mounting washer (5), dished washer (4) and sunshield (1).

(3) Orient thermometer dial (7) properly and tighten cone nut (3) securely.

10-27. CLOCK.

10-28. The clock (20, figure 10-1; 22, figure 10-2; 21, figure 10-3; 16, figure 10-4; or 57, figure 10-4A) is mounted on the instrument panel. On U-8D (ASAC), U-8G and RU-8D aircraft it is mounted on the overhead instrument panel. It is a 22-jewel movement, elapsed-time, spring-driven, 8-day timepiece. It incorporates a stem wind with a knob at the lower left-hand side of the dial; this knob, when pulled and turned, also adjusts the hands. The elapsed time hands, a minute and a second hand, record elapsed time up to one hour. These hands are operated by a knob at the upper right-hand side of the dial which, when depressed, performs one of three functions in the sequence of recording elapsed time. With the hands nominally set at 12 o'clock, the first depression of the knob starts the hands, and the second stops the hands, and the third resets the hands to 12 o'clock.

a. Removal. (1) Remove lens covers or light shields and instrument lamps.

(2) Remove attaching screws and remove clock.

b. Inspection. (1) Inspect clock case for excessive dents and glass for cracks.

(2) Inspect index markings and numerals for legibility. Inspect hands for cracked or peeling paint.

(3) Make sure winding and setting knob (lower left) operates without binding and engages readily for either function.

(4) Make sure elapsed time knob functions properly and operates in correct sequence.

c. Installation. (1) Position clock properly in instrument panel and secure with attaching screws.

(2) Install instrument lamps and lens covers or light shields.

SECTION III NAVIGATION INSTRUMENTS

10-29. DESCRIPTION.

10-30. The navigation instruments provide indications of position and heading used in navigation of the aircraft. The navigation instruments include the magnetic compass and avionics indicators.

10-31. MAGNETIC COMPASS.

10-32. The magnetic compass (6, figure 10-1; 7, figure 10-2; 8, figure 10-3; or 9, figure 10-4) indicates continuously the heading of the aircraft relative to the magnetic field of the earth. The compass is comprised of a liquid-filled case in which a float assembly, incorporating a compass card and magnets, pivots on a

jewel post. The card of the compass is graduated in 5-degree increments. The cardinal headings are shown in enlarged letters: N for north at 0 degrees, E for east at 90 degrees, S for south at 180 degrees, and W for west at 270 degrees. The card is read against a fixed lubber line, which is the vertical white line on the face of the instrument. The compass correction card is mounted above the compass. A compensator assembly is enclosed at the top of the case to provide for magnetically compensating the compass for deviation. The compass dial is illuminated by a light controlled by a circuit breaker switch on the starter panel.

a. Troubleshooting. For troubleshooting procedures for the magnetic compass, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive card error.	External magnetic influence.	Check cargo, baggage, and any equipment recently installed in vicinity of compass for a strong magnetic field using a hand compass. Replace recently installed equipment or compensate compass if error cannot be eliminated.
	Insufficient liquid in bowl.	Replace magnetic compass. (Refer to paragraph 10-31.)
	Bad bearings.	Replace magnetic compass. (Refer to paragraph 10-31.)
Card element not level.	Leak in float chamber or gasket.	Replace magnetic compass. (Refer to paragraph 10-31.)
	Card magnet detached from card.	Replace magnetic compass. (Refer to paragraph 10-31.)
Card sluggish	Dirty jewels, weak card magnets, or restricted rotation.	Replace magnetic compass. (Refer to paragraph 10-31.)
Liquid leakage or bubbles visible under normal flight conditions.	Defective gasket on float chamber.	Replace magnetic compass. (Refer to paragraph 10-31.)

b. Removal. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Remove mounting screws securing magnetic compass out of enclosure far enough to gain access to electrical disconnect at rear of compass case.

(3) Remove disconnect plug and remove magnetic compass.

c. Inspection. (1) Inspect electrical disconnect plug for damage and bent pins. Inspect wiring for security to plug and for damage and deterioration of insulation.

(2) With magnetic compass in normal position, no air bubbles should be visible.

(3) Inspect index markings and numerals for legibility.

(4) Inspect case for damage and signs of fluid leakage.

(5) Inspect window for scratches and discoloration.

d. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Install disconnect plug at rear of magnetic compass.

(3) Position magnetic compass in proper position in enclosure and secure with mounting screws.

(4) Calibrate compass in accordance with instructions contained in step e.

e. Calibration. Prior to calibrating compass, make certain that liquid is clear and that no air bubbles are visible when the compass is in normal position. Make sure the card is level and, when deflected a few degrees on each side of equilibrium position, returns to original position within friction error tolerance for compass. Place aircraft on a compass rose or use a compass of known accuracy to accurately determine heading of aircraft. Remove tools, tool boxes, and other metallic objects not normally carried on aircraft during flight and place at least 25 feet away. Personnel in vicinity of compass should remove tools and other metallic objects from pockets and person which might influence compass, or sighting compass, if used.

(1) Position screw-type NS and EW compensators to null effect by aligning dots on screws with dots on indicator.

NOTE

All adjustments of compensators must be made with a nonmagnetic screwdriver.

(2) Start engine in accordance with TM 55-1510-201-10. Be sure all electrical equipment used during flight, including radio equipment, is turned on.

WARNING

Engine operation will be performed by authorized personnel only.

(3) With engine running, place aircraft on south magnetic heading and record compass deviation from 180 degrees.

(4) Place aircraft on west magnetic heading and record deviation from 270 degrees.

(5) Place aircraft on north magnetic heading and record deviation from 360 degrees. Determine index error C according to example in step (10). With aircraft still on north magnetic heading, adjust NS compensating screw to change compass reading plus or minus an amount equal to index error C.

(6) Place aircraft on east magnetic heading and note deviation from 90 degrees. Determine index error B according to example in step (10). Adjust EW compensator to change compass reading plus or minus an amount equal to index error B.

(7) With aircraft still on east magnetic heading, determine index error A according to step (10).

(8) If index error A exceeds 1 degree, accomplish compensation by turning face of compass relative to heading of aircraft using brass or other nonmagnetic washers or spacers on mounting screws behind compass case. Adjust as necessary to compensate for index error A.

(9) Swing for residual deviations by placing aircraft on eight magnetic headings approximately 45 degrees apart.

NOTE

Compass reading corresponding to exact heading on each of eight headings shall be recorded on compass correction card. Algebraic spread between maximum deviations of all readings shall not exceed 8 degrees.

(10) Compute index errors algebraically as follows:

Index error C = $\frac{\text{North Deviation} - \text{South Deviation}}{2}$

Index error B = $\frac{\text{East Deviation} - \text{West Deviation}}{2}$

$$\text{Index error A} = \frac{\text{North Deviation} + \text{East Deviation} + \text{South Deviation} + \text{West Deviation}}{4}$$

Example:

Deviations with compensator set to null effect.

	Magnetic Heading	Compass Reading	Deviation
South	180°	175-1/2°	+4-1/2°
West	270°	276°	-6°
North	360°	0006-1/2°	-6-1/2°
East	090°	090°	

$$\text{Index error C} = \frac{(-6-1/2) - (+4-1/2)}{2} = \frac{-11}{2} = -5-1/2 \text{ degrees}$$

$$\text{Index error B} = \frac{(0) - (-6)}{2} = \frac{+6}{2} = 3 \text{ degrees}$$

$$\text{Index error A} = \frac{(-6-1/2) + (4-1/2) + (-6)}{4} = \frac{-8}{4} = -2 \text{ degrees}$$

10-33. AVIONICS INDICATORS.

10-34. Avionics indicators provide the pilot and copilot with a visual indication of the attitude

of the aircraft with respect to the earth's magnetic field or the antenna of the radio station to which the respective avionics equipment is turned. For complete organizational maintenance information on avionics equipment, refer to TM 11-1510-201-20.

a. Removal. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected.

(2) Remove lens covers, lamps, and attaching hardware from indicator. Pull indicator out of instrument panel to expose disconnect plug at rear of indicator.

(3) Remove disconnect plug and tie or tape to prevent it from falling behind instrument panel.

(4) Provide suitable cover for disconnect plug and connector at rear of instrument case.

b. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected.

(2) Remove cover from connector at rear of instrument case and from disconnect plug.

(3) Release disconnect plug and install to connector.

(4) Position indicator properly in instrument panel. Install lamps, lens covers, and attaching hardware.

SECTION IV ENGINE INSTRUMENTS

10-35. DESCRIPTION.

10-36. The engine instruments provide the pilot and copilot with indications of rpm, pressure, and temperature. The information derived from the engine instruments provides data concerning the operating condition of the engine. Included in the engine instruments are the tachometer system, dual manifold pressure gage, engine gage units, cylinder temperature indicating system, and carburetor air temperature indicating system.

10-37. TACHOMETER SYSTEM.

10-38. The tachometer system consists of a dual tachometer indicator (5, figure 10-1; 10, figure 10-1A; 6, figure 10-2; 5, figure 10-3; 6, figure 10-4; or 11, figure 10-4A) and two tachometer generators mounted on each engine

accessory housing. Each tachometer generator is driven by its associated aircraft engine and supplies three-phase power to the dual tachometer indicator at a frequency proportional to the engine rpm. Permanent magnets connected to each motor shaft in the indicator create eddy currents in a surrounding drum, causing it to rotate. Rotation of the drum is restrained by the action of a hairspring. The position of the drum is indicated by the position of an attached pointer in relation to the instrument rpm scale. Rotation of the drum against the restraining hairspring is proportional to engine rpm and read directly from the position of the pointer on the graduated scale as engine rpm. The dual pointers are numbered 1 and 2 and indicate rpm of the corresponding engine.

a. Troubleshooting. For troubleshooting the tachometer system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive scale error (low reading)	Weak magners in corresponding tachometer generator	Replace corresponding tachometer generator. (Refer to paragraph 10-37.)
	Weak magnets in dual tachometer indicator	Replace dual tachometer indicator. (Refer to paragraph 10-37.)
Excessive scale error (high reading)	Weak restraining spring in dual tachometer indicator	Replace dual tachometer indicator. (Refer to paragraph 10-37.)
Pointer off 0 with engine inoperative	Pointer shifted	Replace dual tachometer indicator. (Refer to paragraph 10-37.)
No reading or intermittent reading	Loose wiring or disconnect plug	Check all wiring and disconnect plugs visually for security. Tighten connections as necessary.
	Defective dual tachometer indicator	Replace dual tachometer indicator. (Refer to paragraph 10-37.)
	Defective tachometer generator	Replace tachometer generator. (Refer to paragraph 10-37.)

b. Operational Check. (1) With engines inoperative, dual tachometer indicator should show indications of zero rpm.

(2) Start engines in accordance with TM 55-1510-201-10.

WARNING

Engine operation will be accomplished by authorized personnel only.

(3) As throttle is advanced and retarded, dual tachometer indicator should follow each engine rpm smoothly and continuously.

(4) Shut down engines in accordance with TM 55-1510-201-10. Dual tachometer indicator should return to an indication of zero rpm as engine becomes inoperative.

c. Removal. (1) Dual tachometer indicator.

(a) perform steps (1) through (6) of paragraph 10-10c.

(b) Remove 1 and 2 disconnect plugs from rear of dual tachometer indicator.

(c) Remove attaching screws and remove dual tachometer indicator.

NOTE

The following instructions are applicable to either tachometer generator.

(2) Tachometer generator. (a) Place BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected.

(b) Remove necessary engine cowling to gain access to tachometer generator, mounted on left side of accessory drive housing.

(c) Remove electrical disconnect plug from tachometer generator.

(d) Remove attaching hardware and remove tachometer generator.

d. Inspection. (1) Inspect dual tachometer indicator case for excessive dents and glass for cracks.

(2) Inspect electrical connector at rear of dual tachometer indicator case for bent pins, thread damage, and corrosion.

(3) Inspect markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

(4) Make sure range markings are legible

and in proper position. Refer to TM 55-1510-201-10 for proper range markings.

(5) Inspect tachometer generator for dented case. Inspect electrical disconnect plug at rear of tachometer generator for bent pins, thread damage, corrosion, and contamination by grease, oil, etc.

(6) Inspect base of tachometer generator for distortion and elongated mounting holes.

(7) Inspect shaft spline for excessive wear. Make sure shaft turns freely.

e. Installation. (1) Tachometer generator.

(a) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected.

(b) Remove necessary engine cowling to gain access to accessory drive housing.

(c) Install tachometer generator in proper position on accessory drive housing, making sure spline engages properly. Secure with attaching hardware. Torque nuts to 75 inch pounds.

(d) Install electrical disconnect plug to connector on side of tachometer generator. Secure with lock wire.

(e) Reinstall engine cowling.

(2) Dual tachometer indicator. (a) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected.

(b) Install dual tachometer indicator in proper position in instrument panel and secure with attaching screws.

(c) Install 1 and 2 disconnect plugs on corresponding receptacles at rear of dual tachometer indicator.

(d) Perform steps (5) through (9) of paragraph 10-10e.

(e) Install instrument range markings in accordance with step (6) of paragraph 10-12d, if necessary.

10-39. DUAL MANIFOLD PRESSURE GAGE.

10-40. The dual manifold pressure gage (7, figure 10-1; 11, figure 10-1A; 8, figure 10-2; 8, figure 10-3; 5, figure 10-4; or 10, figure 10-4A) is mounted on the instrument panel and connected to each engine intake manifold by tubing and flexible pressure hose. The gage dial is marked in increments of 1 inch with a range of 10 to 75 inches Hg. The gage is calibrated to indicate absolute pressure in inches of mercury measured at the intake manifold of each engine. The dual pointers are numbered 1 and 2 and indicate manifold pressure at the corresponding engine intake manifold.

a. Troubleshooting. For troubleshooting of the dual manifold pressure gage, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive error at ambient barometric pressure	Defective dual manifold pressure gage	Replace dual manifold pressure gage. (Refer to paragraph 10-39.)
Excessive error with engine operating	Leak in lines	Pressure test lines and inspect for leaks.
Pointer sluggish or vibrates	Defective dual manifold pressure gage	Replace dual manifold pressure gage. (Refer to paragraph 10-39.)

b. Operational Check. (1) With engine inoperative, dual manifold pressure gage should show an indication equal to ambient pressure.

(2) Start engine in accordance with TM 55-1510-201-10.

WARNING

Engine operation will be accomplished by authorized personnel only.

(3) With engine warm and operating normally, dual manifold pressure gage should show an indication within normal operating limits to engine.

(4) Shut down engine in accordance with TM 55-1510-201-10. Dual manifold pressure gage should indicate ambient barometric pressure.

c. Removal. (1) Perform steps (1) through (6) of paragraph 10-10c.

(2) Disconnect 1 and 2 hose from rear of dual

manifold pressure gage. Provide suitable cover for hose and instrument openings.

(3) Remove attaching screws and remove dual manifold pressure gage.

d. Inspection. (1) Inspect dual manifold pressure gage case for excessive dents and glass for cracks.

(2) Inspect fitting at rear of dual manifold pressure gage for stripped threads and other conditions which would prevent an airtight connection.

(3) Inspect index lines and numerals for legibility.

(4) Make sure range markings are legible. Refer to TM 55-1510-201-10 for location of range markings.

e. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected.

(2) Remove cover from hose and instrument openings at rear of dual manifold pressure gage. Coat all male threaded surfaces lightly with antiseize compound (item 45, table 1-8).

CAUTION

Use antiseize compound sparingly and remove all excess to prevent contamination of interior of instrument and lines. Never apply antiseize compound to female threaded surfaces, as any excess will be carried into interior of components as joint is tightened.

(3) Install dual manifold pressure gage in proper position in instrument panel and secure with attaching screws.

(4) Install 1 and 2 hose to corresponding fittings at rear of dual manifold pressure gage.

(5) Perform steps (5) through (9) of paragraph 10-10e.

(6) Install range markings in accordance with step (6) of paragraph 10-12d, if necessary.

10-41. ENGINE GAGE UNIT SYSTEM.

10-42. Each engine gage unit system comprises three independent pressure and temperature gage systems with gages in a common case. Each engine gage unit (9, figure 10-1; 12 and 14, figure 10-1A; 9, figure 10-2 and 10-3; 7, figure 10-4; or 12 and 15, figure 10-4A) includes an oil temperature indicator, an oil pressure gage, and a fuel pressure gage. The oil temperature indicator is of the electrical-resistance, ratio-type movement. The indicator utilizes a modified Wheatstone bridge, one leg of which is a thermometer bulb installed in the oil system inlet line and connected by wiring to the indicator. The indicator scale registers the oil temperature in degrees centigrade. The system is operated from the main dc bus and protected by a circuit breaker marked TEMP INDICATORS. The indicator dial is graduated from -50° to +150°C. The oil pressure gage is comprised of a conventional Bourdon spring with a sector and pinion movement to amplify tube movement. Changes of oil system cause distortion of the Bourdon tube, resulting in a change in indicated pressure. The range of the oil pressure gage is 0 to 200 psi, and it is connected directly into the engine oil system. The fuel pressure gage is of the same basic construction as the oil pressure gage. The range of the fuel pressure gage is 0 to 25 psi.

a. Troubleshooting. Substitution of an engine gage unit of known quality for suspected faulty engine gage unit is the only feasible means of troubleshooting fuel and oil pressure gage malfunctions. For troubleshooting procedures for the oil temperature system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer remains mechanical 0	Open circuit in power supply or open ground connection	Inspect wiring and restore circuit.
Pointer forced off top end of scale	Temperature bulb shorted	Replace temperature bulb. (Refer to paragraph 10-41.)
	Short circuit in temperature bulb leads	Repair leads or replace temperature bulb. (Refer to paragraph 10-41.)
	Short circuit in engine gage unit	Replace engine gage unit. (Refer to paragraphs 10-41.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer forced off bottom end of scale	Ground connected to wrong lead from indicator	Reconnect ground to proper indicator lead.
Erratic indications	Intermittent short or open circuit	Locate and repair.
	Defective connection in engine gage unit	Replace engine gage unit. (Refer to paragraph 10-41.)
Pointer remains on scale with the power off	Foreign material in engine gage unit	Replace engine gage unit. (Refer to paragraph 10-41.)

b. Operational Check. (1) Engage TEMP INDICATORS circuit breaker and connect a source of external power to aircraft. With engine cold and inoperative, engine oil temperature indication should equal ambient temperature.

NOTE

Indicated temperature may be somewhat higher than ambient temperature if aircraft has been parked in direct sunlight, due to heating effect of sun.

(2) Start engine in accordance with TM 55-1510-201-10. With engine warm and operating normally, oil temperature, oil pressure, and fuel pressure indications should be within normal operating limits of engine.

WARNING

Engine operation will be accomplished by authorized personnel only.

(3) Shut down engine in accordance with TM 55-1510-201-10. Oil and fuel pressure indications should return to zero.

(4) Disengage TEMP INDICATORS circuit breaker. Oil temperature indicator pointer should be off scale at low end.

NOTE

The following instructions apply to No. 1 or No. 2 engine gage unit and associated temperature bulb.

c. Servicing. Due to the lack of oil flow in the line from the engine gage unit to the engine oil system, oil in this line is not heated or diluted. During cold weather this oil becomes thick and causes sluggish reaction to changes in oil pressure. To overcome this condition, perform the following service procedures.

(1) Disconnect the oil pressure gage line at the engine unit.

CAUTION

Do not disconnect the oil pressure line at the engine.

(2) Connect a suitable filler gun, master pressure gage, or other pressure filling device to oil pressure line.

(3) Slowly charge line with turbine oil (item 33, table 1-8), with sufficient quantity to fill line as far as the engine.

(4) Allow pressure to equalize and disconnect filling device. Connect oil pressure line to engine gage unit.

NOTE

This operation may be repeated periodically as required. Turbine oil in the line will gradually be absorbed and replaced by engine oil over a period of time.

d. Removal. (1) Engine gage unit.

(a) Perform steps (1) through (6) of paragraph 10-10c.

(b) Provide a suitable container for spilled fluids and remove fuel and oil lines from elbows at rear of engine gage unit. Plug or cap lines and openings in instrument case.

(c) Remove disconnect plug from rear of engine gage unit.

(d) Remove attaching screws and remove engine gage unit. Remove elbows from engine gage unit.

(2) Temperature bulb. (a) Remove necessary engine cowling to gain access to temperature bulb, located at oil cooler inlet. Remove disconnect plug from temperature bulb.

(b) Provide a suitable plug for opening in oil system and remove temperature bulb and gasket.

e. Inspection. (1) Inspect engine gage unit

case for excessive dents and glass for cracks.

(2) Inspect fittings at rear of engine gage unit case for stripped threads or other damage which would prevent a liquid-tight connection.

(3) Inspect index markings and numerals for legibility. Inspect pointers for cracked or peeling paint.

(4) Make sure range markings are legible and in proper position. Refer to TM 55-1510-201-10 for proper range markings.

(5) Inspect temperature bulb for dents, stripped threads, and other damage.

NOTE

The following instructions apply to No. 1 or No. 2 engine gage unit and associated temperature bulb.

f. Installation. (1) Temperature bulb.

(a) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(b) Remove plug and install temperature bulb with a serviceable gasket in oil supply line at cooler.

(c) Install disconnect plug on temperature bulb and secure with lock wire.

(d) Secure engine cowling.

(2) Engine gage unit. (a) Coat male threaded surfaces of elbows lightly with antiseize compound (item 45, table 1-8).

CAUTION

Use antiseize compound sparingly and remove all excess to prevent contamination of interior of instruments and lines. Never apply antiseize compound to female threaded surfaces, as any excess will be carried into the interior of the components as the joint is tightened.

(b) Remove cover from openings in rear of engine gage unit and install elbows.

(c) Install engine gage unit in proper position in engine instrument panel and secure with attaching screws.

(d) Install fuel and oil lines to elbows at rear of engine gage unit.

CAUTION

Do not cross-connect fuel and oil lines, as damage to the fuel pressure gage will result if oil system pressure is applied.

(e) Install disconnect plug at rear of engine gage unit.

(f) Perform steps (5) through (9) of paragraph 10-10e.

(g) Install range markings in accordance with step (6) of paragraph 10-12d, if necessary.

10-43. CYLINDER TEMPERATURE INDICATING SYSTEM.

10-44. The cylinder temperature indicating system comprises a temperature bulb, located in No. 5 cylinder of each engine beneath the spark plug, and the dual cylinder temperature indicator (16, figure 10-1; 38, figure 10-1A; 16, figure 10-2; 11, figure 10-3; 8, figure 10-4; or 19, figure 10-4A) located on the instrument panel. The temperature bulb is basically an electrical-resistance type which regulates current flow through itself in proportion to the temperature to which it is subjected. The indicator is basically a dual D-Arsonval galvanometer movement having a spring-loaded pivoting coil located in a strong magnetic field. The movement of each attached pointer is proportional to current flow through the coil and indicates cylinder temperature in degrees centigrade. Range of the indicator is 0° to 300° C.

a. Troubleshooting. For troubleshooting procedures for the cylinder temperature indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Both pointers remain on mechanical 0	Open circuit in power supply or open ground connection	Inspect wiring and restore circuit.
Either pointer forced off top end of scale	Temperature bulb shorted	Replace temperature bulb. (Refer to paragraph 10-43.)
	Short circuit in bulb leads	Repair leads or replace temperature bulb. (Refer to paragraph 10-43.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
	Short circuit in dual cylinder	Replace dual cylinder temperature indicator. (Refer to paragraph 10-43.)
Either pointer forced off bottom end of scale	Ground connected to wrong lead from dual cylinder temperature indicator.	Reconnect ground to proper indicator lead.
Erratic indications	Intermittent short or open circuit	Locate and repair.
	Defective connection in dual cylinder temperature indicator	Replace dual cylinder temperature indicator. (Refer to paragraph 10-43.)
Pointer remains on scale with power off	Foreign material in dual cylinder temperature indicator	Replace dual cylinder temperature indicator. (Refer to paragraph 10-43.)

b. Operational Check. (1) Disengage TEMP INDICATORS circuit breaker. Both dual cylinder temperature indicator pointers should be off scale at low temperature end.

(2) Connect a source of external power to aircraft and engage TEMP INDICATORS circuit breaker. With engines cold and inoperative, both dual cylinder temperature indicator pointers should indicate ambient temperature.

NOTE

Indicated temperature may be somewhat higher than ambient temperature if aircraft has been parked in direct sunlight, due to heating effect of sun.

(3) Start engines in accordance with applicable operator's manual (-10).

WARNING

Engine operation will be accomplished by authorized personnel only.

(4) With engine warm and operating normally, dual cylinder temperature indicator should show an indication within normal operating limits for each engine.

(5) Shut down engines in accordance with applicable operator's manual (-10) and disengage TEMP INDICATORS circuit breaker. Both dual cylinder temperature indicator pointers should be off scale at low temperature end.

c. Removal. (1) Dual cylinder temperature indicator. (a) Perform steps (1) through (6) of paragraph 10-10c.

(b) Disconnect 1 and 2 electrical disconnect plugs from rear of dual cylinder temperature indicator. Provide suitable cover for plugs and rear of instrument case.

(c) Remove attaching hardware and remove dual cylinder temperature indicator.

NOTE

The following instructions apply to the temperature bulb in either engine.

(2) Temperature bulb. (a) Unfasten necessary engine cowling to gain access to No. 5 cylinder.

(b) Remove disconnect plug from temperature bulb, located beneath the lower spark plug in No. 5 cylinder.

(c) Remove temperature bulb.

d. Inspection. (1) Inspect temperature bulb well in cylinder housing for foreign matter, corrosion, and malformed threads.

(2) Inspect temperature bulb for cracks, dents, corrosion, malformed threads, and loose terminals.

(3) Inspect electrical connectors at rear of dual cylinder temperature indicator for damaged threads, corrosion, and distortion.

(4) Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

(5) Make sure range markings are legible and in proper position. Refer to applicable operator's manual (-10) for proper range markings.

NOTE

The following instructions apply to temperature bulb in either engine.

e. Installation. (1) Temperature bulb.

(a) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(b) Install temperature bulb in proper position in No. 5 cylinder, beneath the lower spark plug.

(c) Install disconnect plug on temperature bulb.

(d) Secure engine cowling.

(2) Dual cylinder temperature indicator.

(a) Position dual cylinder temperature indicator properly in instrument panel and secure with attaching hardware.

(b) Remove cover and connect 1 and 2 electrical disconnect plugs to corresponding receptacles at rear of indicator.

(c) Perform steps (5) through (9) of paragraph 10-10e.

(d) Install range markings in accordance with step (6) of paragraph 10-12d if necessary.

10-45. CARBURETOR AIR TEMPERATURE INDICATING SYSTEM.(U-8D,U-8G,RU-8D)

10-46. The carburetor air temperature system is comprised of a temperature bulb located in the carburetor air valve, the dual carburetor air temperature indicator (10, figure 10-1; 11, figure 10-2; or 10, figure 10-3), located on the instrument panel. Each temperature bulb is an electrical-resistance type which regulates current flow in proportion to the temperature to which it is subjected. The indicator is basically a dual D'Arsonval Galvanometer movement having a spring loaded pivoting coil located in a strong magnetic field. The movement of each attached pointer is proportional to current flow through the coil and indicates carburetor air temperature in degrees centigrade, range of the indicator is -50°C to $+100^{\circ}\text{C}$.

a. Troubleshooting. For troubleshooting procedures for the carburetor air temperature indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Both pointers remain on mechanical 0	Open circuit in power supply or open ground connection	Inspect wiring and restore circuit.
Pointer forced off top end of scale	Temperature bulb shorted	Replace temperature bulb. (Refer to paragraph 10-45.)
	Short circuit in bulb leads	Repair leads or replace temperature bulb. (Refer to paragraph 10-45.)
	Short circuit in dual carburetor air temperature indicator	Replace dual carburetor air temperature indicator. (Refer to paragraph 10-45.)
Pointer forced off bottom end of scale	Ground connected to wrong lead from indicator	Reconnect ground to proper indicator lead.
Erratic indications	Intermittent short or open circuit	Locate and repair.
	Defective connection in dual carburetor air temperature indicator	Replace dual carburetor air temperature indicator. (Refer to paragraph 10-45.)
Pointer remains on scale with power off	Foreign material in dual carburetor air temperature indicator	Replace dual carburetor air temperature indicator. (Refer to paragraph 10-45.)

b. Operational Check. (1) Disengage TEMP INDICATORS circuit breaker. Make sure external power source is disconnected. Dual carburetor air temperature indicator pointers should be off scale at low end.

(2) Connect a source of external power to aircraft and engage TEMP INDICATORS circuit breaker. Dual carburetor air temperature indicator should show indications equal to ambient temperature.

NOTE

Indicated temperature may be somewhat higher than ambient temperature if aircraft has been parked in direct sunlight, due to heating effect of sun.

(3) Disconnect external power source. Dual carburetor air temperature indicator pointers should be off scale at low temperature end.

c. Removal. (1) Dual carburetor air temperature indicator. (a) Perform steps (1) through (6) of paragraph 10-10c.

(b) Disconnect electrical disconnect plugs from rear of dual carburetor air temperature indicator. Provide suitable cover for plugs and rear of instrument case.

(c) Remove attaching hardware and remove dual carburetor air temperature indicator.

NOTE

The following instructions apply to temperature bulb at either supercharger housing.

(2) Temperature bulb. (a) Unfasten necessary engine cowling to gain access to supercharger housing.

(b) Remove disconnect plug from temperature bulb.

(c) Remove temperature bulb.

NOTE

Provide suitable cover or plug for opening if temperature bulb is not immediately replaced.

d. Inspection. (1) Inspect dual carburetor air temperature indicator case for excessive dents, and glass for cracks.

(2) Inspect electrical connectors at rear of dual carburetor air temperature indicator for damaged threads, corrosion, and distortion.

(3) Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

(4) Make sure range markings are legible and in proper position. Refer to TM 55-1510-201-10 for proper range markings.

(5) Inspect temperature bulb for cracks, dents, corrosion, malformed threads, and loose terminals and cracks.

NOTE

The following instructions apply to temperature bulb at either supercharger housing.

e. Installation. (1) Temperature bulb. (a) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(b) Install temperature bulb in proper position in supercharger housing.

(c) Install disconnect plug on temperature bulb.

(d) Secure engine cowling.

(2) Dual carburetor air temperature indicator. (a) Position dual carburetor air temperature indicator properly in instrument panel and secure with attaching hardware.

(b) Remove cover and connect electrical disconnect plugs to corresponding receptacles at rear of indicator.

(c) Perform steps (5) through (9) of paragraph 10-10e.

(d) Install range markings in accordance with step (6) of paragraph 10-12d, if necessary.

SECTION V MISCELLANEOUS INSTRUMENTS

10-47. DESCRIPTION.

10-48. The miscellaneous instruments include the fuel quantity indicating system, suction gage, wing flap position indicating system, propeller anti-icing fluid quantity indicating system, de-icer pressure gage, and voltammeters.

10-49. FUEL QUANTITY INDICATING SYSTEM.

10-50. The fuel quantity indicating system (see figures 5-20 and 5-21) provides a continuous

indication of fuel quantity in fractions of tank capacity in the main tanks, and in fractions of combined tank capacity in the auxiliary fuel tanks. A dc selsyn fuel quantity transmitter, located in each fuel tank, positions the pointer of its corresponding indicator. For fuel quantity transmitter maintenance instructions, refer to paragraph 5-98. Power for the fuel quantity indicating system is supplied through the FUEL GAGES circuit breaker.

a. Troubleshooting. For troubleshooting procedures for the fuel quantity indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No pointer movement	Poor or broken electrical connections	Check and secure connections.
	Defective fuel quantity indicator	Replace fuel quantity indicator. (Refer to paragraph 10-49.)
Pointer does not move	Broken or poor electrical connection to relevant transmitter	Check and secure connection.
	Defective fuel quantity transmitter	Replace fuel quantity transmitter. (Refer to paragraph 5-98.)
	Defective fuel quantity indicator	Replace fuel quantity indicator. (Refer to paragraph 10-49.)
Pointer sluggish	Defective fuel quantity indicator	Replace fuel quantity indicator. (Refer to paragraph 10-49.)
	Defective fuel quantity transmitter	Replace fuel quantity transmitter. (Refer to paragraph 5-98.)
Incorrect reading on one tank	Defective fuel quantity indicator	Replace fuel quantity indicator. (Refer to paragraph 10-49.)
Erratic readings	Poor electrical connections	Check and secure connections.

b. Operational Check. (1) Connect a source of external power to aircraft.

(2) Engage FUEL GAGES circuit breaker and observe fuel quantity indicator. Indications should agree with known quantity of fuel in tanks.

(3) Disconnect external power source.

c. Removal. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Remove attaching screws and remove fuel system control panel. Pull out panel as far as slack in wire bundle will allow.

(3) Remove edge lights, fuel boost pump switch knobs, and upper portion of panel placard.

(4) Disconnect electrical wiring at rear of fuel quantity indicators to be removed.

(5) Remove nuts, lockwashers, and screws, and remove fuel quantity indicators.

NOTE

Refer to paragraph 5-98 for removal of fuel quantity transmitters.

d. Inspection. (1) Inspect fuel quantity indicator case for excessive dents and glass for cracks.

(2) Inspect terminals at rear of fuel quantity indicator for distortion, corrosion, thread damage, and signs of arcing.

(3) Inspect index markings and numerals for legibility. Inspect pointers for cracked or peeling paint.

e. Installation. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(2) Install fuel quantity indicators and secure with screws, lockwashers, and nuts.

(3) Connect electrical wiring to proper terminals at rear of indicators.

(4) Install upper portion of panel placard, edge lights, and fuel boost pump switch knobs.

(5) Install fuel system control panel in proper position, making sure wiring is not pinched or twisted. Secure with attaching screws.

10-51. SUCTION GAGE.

10-52. The suction gage indicates suction in inches of mercury in the vacuum system. On the U-8D, U-8G, and RU-8D aircraft, the normal suction operating range is 3.75 to 4.25 inches Hg, indicated on the face of the suction

gage by a green range marking. The minimum and maximum range is 3.75 to 4.6 inches Hg, indicated by red range markings. On the U-8F aircraft, the normal operating range is 3.75 to 5.25 inches Hg, with a minimum and maximum range of 3.75 to 5.25 inches Hg. The suction gage (18, figure 10-1; 39, figure 10-1A; or 17, figure 10-2) of the U-8D and U-8G aircraft is located on the left side of the instrument panel below the radio compass indicator. On the RU-8D, the suction gage (13, figure 10-3) is located on the right side of the instrument panel. On U-8F (STD) aircraft, the suction gage is located on the right-hand side panel next to the copilot; and on U-8F (ASAC) aircraft, on the right side of the instrument panel (30, figure 10-4A).

a. Troubleshooting. As the suction gage consists of a self-contained unit deriving motive power from the vacuum system, substitution of a suction gage of known quality for a suspected faulty gage is the only feasible means of troubleshooting.

b. Operational Check. (1) With engine inoperative, suction gage should show an indication of 0.

(2) Start engine in accordance with applicable operator's manual (-10).

WARNING

Engine operation will be accomplished by authorized personnel only.

(3) Suction gage should show an indication within normal operating limits.

(4) Shut down engine in accordance with applicable operator's manual (-10). Suction gage should show an indication of 0 inch Hg.

c. Removal. (1) Remove instrument light over suction gage.

(2) Disconnect hose from suction gage and cap or plug exposed fittings and ports.

(3) Remove screws securing suction gage and remove gage.

d. Inspection. (1) Inspect suction gage case for excessive dents and gage face for broken glass.

(2) Inspect fitting at rear of case for stripped threads, burrs, or other conditions which would prevent an airtight connection.

(3) Inspect index lines and numerals for legibility.

(4) Make sure range markings are positioned properly and are legible. Refer to applicable operator's manual (-10) for location of range markings.

e. Installation. (1) Position suction gage and secure with screws.

(2) Remove caps or plugs and coat male threads surfaces lightly with antiseize compound (item 45, table 1-8). Connect hose to gage.

CAUTION

Use antiseize compound sparingly and remove all excess to prevent contamination of interior of instrument and lines. Never apply antiseize compound to female threaded surfaces, as any excess will be carried into the interior of the components as the fitting is tightened.

- (3) Install instrument light over suction gage.
 (4) Install range markings in accordance with step (6) of paragraph 10-12d, if necessary.

10-53. WING FLAP POSITION INDICATING SYSTEM. (U-8F)

10-54. The wing flap position indicating system consists of a wing flap position indicator (1, figure 10-5), located on the center section of the subpanel adjacent to the flap switch, connected to a wing flap position transmitter. Located in the trailing edge of the right wing, the wing flap position transmitter is connected by mechanical linkage to the right flap. When the transmitter is turned by positioning the flaps, three coils in the dc selsyn type indicator cause the indicator pointer to move an amount relative to the change in flap position. A permanent magnet located with the indicator case pulls the pointer off scale when power to the system is interrupted. Power for the system is supplied through the FLAP LD IND circuit breaker.

a. Troubleshooting. For troubleshooting procedures for the wing flap position indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Pointer remains off scale when power is applied to circuit.	Defective wiring.	Perform continuity check on all wiring. Secure wiring as necessary.
	Defective wing flap position transmitter	Replace wing flap position transmitter. (Refer to paragraph 10-53.)
Obviously incorrect indication.	Defective wing flap position transmitter.	Replace wing flap position transmitter. (Refer to paragraph 10-53.)
	Defective wing flap position indicator.	Replace wing flap position indicator. (Refer to paragraph 10-53.)

b. Operational Check. (1) Disengage FLAP LD IND circuit breaker. Wing flap position indicator pointer should be off scale.

(2) Connect an external power source to the aircraft and engage FLAP LD IND circuit breaker. Wing flap position indicator pointer should show an indication corresponding to actual position of flaps.

(3) Lower flaps completely. Wing flap position indicator should read DOWN.

(4) Raise flaps completely. Wing flap position indicator should read UP.

(5) Disconnect external power source.

c. Removal. (1) Wing flap position indicator.

(a) Place BATTERY, BATTERY MASTER,

and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(b) Loosen screw at upper left of wing flap position indicator until indicator is loose in mounting.

(c) Withdraw indicator far enough to gain access to disconnect plug at rear of indicator case.

(d) Remove disconnect plug and secure plug to prevent it from falling back through instrument opening.

(2) Wing flap position transmitter. (a) Connect an external power source to aircraft and lower flaps completely. Disconnect external power

source, and disengage FLAP LD IND circuit breaker.

(b) At right wing flap actuator shaft, remove bolt, nut, and washer securing transmitter arm to shaft.

(c) Remove disconnect plug from rear of wing flap position transmitter.

(d) Remove mounting screws and remove wing flap position transmitter.

d. Inspection. (1) Inspect wing flap position indicator case for excessive dents and glass for cracks.

(2) Inspect disconnect plug at rear of indicator case for bent pins, corrosion, thread damage, and signs of arcing.

(3) Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

(4) Inspect wing flap position transmitter for excessive dents, corrosion, and elongated mounting holes.

(5) Inspect transmitter arm for elongated mounting holes, distortion, and security to transmitter rotor.

e. Installation. (1) Wing flap position transmitter.

(a) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(b) Install wing flap position transmitter and secure with mounting screws.

(c) Install disconnect plug at rear of wing flap position transmitter.

(d) Install transmitter arm on wing flap actuator shaft and secure with bolt, washer, and nut.

(2) Wing flap position indicator. (a) Release disconnect plug at instrument subpanel and install at rear of wing flap position indicator.

(b) Feed disconnect plug and wiring through instrument opening and install indicator in proper position.

(c) Tighten screw at upper left of opening until indicator is secure.

10-55. PROPELLER ANTI-ICING FLUID QUANTITY INDICATING SYSTEM.

10-56. The propeller anti-icing fluid quantity indicating system provides the pilot and copilot with an indication of anti-icing fluid remaining in the supply tank. Fluid indications are in fractions of tank capacity. The indicating system consists of the propeller anti-icing fluid quantity transmitter and a fluid quantity gage (14, figure 10-1; 23, figure 10-1A; 14, figure 10-2; or 14, figure 10-3) is located at the extreme right-hand side of the instrument panel. On U-8F aircraft, the propeller anti-icing fluid quantity gage (2, figure 10-5) is installed on the left subpanel. The fluid quantity transmitter is located in the anti-icing supply tank on all aircraft. Power for the system is supplied from the main bus through the SURFACE DE-ICE circuit breaker.

a. Troubleshooting. For troubleshooting procedures for the propeller anti-icing fluid quantity indicating system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No pointer movement	Poor or broken electrical connections.	Check and secure connections.
	Defective propeller anti-icing fluid quantity gage.	Replace propeller anti-icing fluid quantity gage. (Refer to paragraph 10-55.)
	Defective fluid quantity transmitter	Replace fluid quantity transmitter. Refer to paragraph 10-55.
Pointer sluggish	Defective propeller anti-icing fluid quantity gage.	Replace propeller anti-icing fluid quantity gage. (Refer to paragraph 10-55.)
	Defective fluid quantity transmitter.	Replace fluid quantity transmitter. Refer to paragraph 10-55.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Incorrect reading.	Defective propeller anti-icing fluid quantity gage.	Replace propeller anti-icing fluid quantity gage. (Refer to paragraph 10-55.)
Erratic readings.	Poor electrical connections.	Check and secure connections.

b. Operational Check. (1) Connect a source of external power to aircraft.

(2) Engage SURFACE DE-ICE circuit breaker and observe anti-icing fluid quantity gage. Indication should agree with known quantity of fluid in tanks.

(3) Disconnect external power source.

c. Removal. (1) Propeller anti-icing fluid quantity gage. (a) Perform steps 1 through 3 below to remove gage from U-8D, U-8G, and RU-8D aircraft.

1. Perform steps (1) through (6) of paragraph 10-10c.

2. Remove disconnect plug from rear of propeller anti-icing fluid quantity gage.

3. Remove attaching screws and remove propeller anti-icing fluid quantity gage from instrument panel.

(b) Perform steps 2 and 3 above to remove gage from U-8F aircraft, except that gage shall be removed from left subpanel.

(2) Fluid quantity transmitter. (a) Remove anti-icing supply tank in accordance with paragraph 11-67.

(b) Remove attaching screws and remove fluid quantity transmitter from supply tank.

(c) Remove gasket.

d. Inspection. (1) Inspect propeller anti-icing fluid quantity gage case for excessive dents and glass for cracks.

(2) Inspect disconnect plug at rear of gage for bent pins, corrosion, thread damage, and signs of arcing.

(3) Inspect index markings, letters, and numerals for legibility, and inspect pointer for cracked or peeling paint.

(4) Inspect fluid quantity transmitter float for saturation or punctures and for security to float arm.

(5) Inspect fluid quantity transmitter for elongated mounting holes, and for scratches or other damage to gasket mating surfaces that would prevent a liquid-tight seal.

(6) Inspect connector for bent pins, corrosion, thread damage, and signs of arcing.

(7) Inspect fluid quantity transmitter float arm for freedom of travel from FULL to EMPTY position.

(8) Inspect gasket for serviceability.

e. Installation. (1) Fluid quantity transmitter.

(a) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(b) Position new gasket and fluid quantity transmitter properly in anti-icing supply tank and secure with attaching screws.

(c) Install anti-icing supply tank in accordance with paragraph 11-67.

(2) Propeller anti-icing fluid quantity gage.

(a) Install propeller anti-icing fluid quantity gage on U-8D, U-8G, and RU-8D aircraft in accordance with steps 1 through 3 below.

1. Position propeller anti-icing fluid quantity gage.

2. Install disconnect plug at rear of anti-icing fluid quantity gage.

3. Perform steps (5) through (9) of paragraph 10-10e.

(b) Install propeller anti-icing fluid quantity gage on U-8F aircraft in accordance with steps 1 and 2 above, except that gage shall be installed on left subpanel.

10-57. DEICER PRESSURE GAGE

10-58. The deicer pressure gage provides an indication of pressure available at the propeller deicer system line. The deicer pressure gage consists of a sealed, pressure-sensitive capsule actuated by deicer system pressure. Movements of the capsule caused by changes in pressure are converted by mechanical linkage to pointer movement over the calibrated dial. The dial is calibrated in pounds per square inch and has a range of 0 to 20 psi. On U-8D, U-8G, and RU-8D aircraft, the deicer pressure gage (13, figure 10-1, 22, figure 10-1A; 13, figure 10-2; or 12, figure 10-3) is located on the right-hand side of the instrument panel. On U-8F aircraft, the deicer pressure gage is located on the right side panel next to the copilot.

a. Troubleshooting. As the deicer pressure gage consists of a self-contained unit deriving motive power from the deicer pressure system, substitution of a deicer pressure gage of known quality for a suspected faulty gage is the only feasible means of troubleshooting.

b. Operational Check. (1) Start aircraft in accordance with applicable operators manual (-10). Disengage SURFACE DE-ICE circuit breaker. De-icer should show an indication of 0 psi on pressure gage.

(2) Engage SURFACE DE-ICE circuit breaker and place DE-ICER switch in ON position. Deicer pressure gage should show an indication within normal operating limits of the system.

c. Removal. (1) Remove deicer pressure gage from U-8D, U-8G, and RU-8D aircraft in accordance with steps (a) through (c) below:

(a) Perform steps (1) through (6) of paragraph 10-10c.

(b) Remove line and coupling at rear of deicer pressure gage.

(c) Remove attaching screws and pull gage from instrument panel. Cap or plug open lines or ports.

(2) Remove deicer pressure gage from U-8F aircraft in accordance with steps (a) through (6) below.

(a) Remove attaching screws and pull gage out far enough to expose line and coupling at rear of gage.

(b) Remove line and coupling at rear of deicer pressure gage.

(c) Cap or plug open lines or ports.

d. Inspection. (1) Inspect deicer pressure gage case for excessive dents and glass for cracks.

(2) Inspect fitting at rear of deicer gage for stripped threads and other conditions which would prevent an airtight connection.

(3) Inspect index lines and numerals for legibility. Inspect pointer for cracked or peeling paint.

e. Installation. (1) Install deicer pressure gage on U-8D, U-8G, and RU-8D, aircraft in accordance with steps (a) through (g) below.

(a) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Open applicable circuit breakers.

(b) Coat male threaded surfaces of elbow fitting lightly with antiseize compound (item 45, table 1-8).

CAUTION

Use antiseize compound sparingly and remove all excess to prevent contamination of interior of instrument and lines. Never apply antiseize compound to female threaded surfaces, as any excess will be carried into the interior of the components as the joint is tightened.

(c) Remove plug from rear of deicer pressure gage.

(d) Install deicer pressure gage in proper position on instrument panel and secure with attaching screws.

(e) Remove cap and attach line to elbow at rear of deicer gage.

(f) Perform steps (5) through (9) of paragraph 10-10e.

(g) Install range markings in accordance with step (6) of paragraph 10-12d, if necessary.

(2) Install deicer pressure gage on U-8F aircraft in accordance with steps (a) through (e) below.

(a) Perform steps (1) (a) through (c) above.

(b) Position deicer pressure gage close enough to mounting hole to connect line at rear of gage.

(d) Install deicer pressure gage in proper position on right side panel and secure with attaching screws.

(e) Install range markings in accordance with step (6) of paragraph 10-12d, if necessary.

10-59. VOLTAMMETERS.

10-60. The left and right voltmeters (17, figure 10-1; 21, figure 10-2; 20, figure 10-3; or 3, figure 10-5) indicate respective generator output. Normal indication shows respective generator load in amperes. When button at lower left corner of either voltmeter is depressed, voltage from main bus is shown. If a generator is inoperative, no indication of amperes on the respective voltmeter is shown. However, with button depressed, bus voltage is shown unless the respective generator circuit breaker has disengaged, except on U-8F aircraft serial numbers 62-3849 thru 62-3875. On these aircraft the voltmeter will indicate only when generators are producing voltage. On U-8D (STD) aircraft the voltmeters are located on the instrument panel. On U-8G, RU-8D and U-8D (ASAC) aircraft, the voltmeters are located on the overhead instrument panel. On U-8F aircraft, the voltmeters are located on the left subpanel.

NOTE

The voltmeters are identical; the following maintenance instructions apply to either voltmeter.

a. Troubleshooting. As the voltmeter consists of a self-contained unit which derives motive power from the electrical system, substitution of a voltmeter of known quality for a suspected faulty unit is the only feasible means of troubleshooting.

b. Operational Check. (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Observe voltmeter readings before and while depressing button at lower left of voltmeter. Amperage and voltage readings should be 0.

(2) Place BATTERY and BATTERY MASTER switches in ON position and depress button. With battery fully charged and in good condition, voltage reading should be approximately 24 volts. This does not apply to U-8F aircraft referenced in paragraph 10-60.

(3) Connect a metered source of external power to aircraft. Voltage reading should be equal to that of source (approximately 28 volts). This does not apply to U-8F aircraft referenced in paragraph 10-60.

(4) Place GENERATOR MASTER switches in ON position and start engines in accordance with TM 55-1510-201-10. With all other electrical equipment OFF, place LEFT and RIGHT LANDING LIGHTS switches in ON position. Left and right voltmeters should show readings of 8.5 to 9.5 amps with engine rpm above generator cut-in rpm.

WARNING

Engine operation will be accomplished by authorized personnel only.

CAUTION

Do not operate landing lights for more than 1 minute with aircraft on ground to prevent possible damage due to overheating.

(5) Place LEFT and RIGHT LANDING LIGHTS switches in OFF position. Shut down engines in accordance with TM 55-1510-201-10 and disconnect external power source.

c. Removal. Remove voltmeters in the U-8D (STD) as follows:

(1) Disconnect battery and perform steps (1) through (6) of paragraph 10-10c.

(2) Tag and disconnect wiring from rear of voltmeter.

(3) Remove attaching screws and remove voltmeter.

d. Removal. Remove voltmeters in the U-8G, RU-8D, and U-8D (ASAC) as follows:

(1) Disconnect battery. Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position. Make sure external power source is disconnected. Open applicable circuit breakers.

(2) Remove screws securing voltmeter to overhead instrument panel.

(3) Pull voltmeter out far enough to gain access to wiring. Tag and disconnect wiring from rear of voltmeter.

e. Remove. Remove voltmeters in the U-8F as follows:

(1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Disconnect battery.

(2) Remove left subpanel back plate and remove and tag wiring at rear of voltmeter.

(3) Remove light assembly and screws securing voltmeter to subpanel. Remove voltmeter from rear of panel.

f. Inspection. (1) Inspect voltmeter case for excessive dents and glass for cracks.

(2) Inspect terminals at rear of voltmeter case for malformed threads and distortion.

(3) Inspect index markings and numerals for legibility. Inspect pointer for cracked or peeling paint.

g. Installation. Install voltmeters in the U-8D (STD) as follows: (1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Disconnect battery.

(2) Install voltmeter in proper position in instrument panel and secure with attaching screws.

(3) Connect wiring to proper terminals, making sure jumper wire is included from terminals A+ to V+. Perform steps (5) through (9) of paragraph 10-10e.

NOTE

Replacement voltmeter terminal marking may differ from that of the meter that was removed. If the markings of the replacement meters are A+, A-, and V- (three terminals), A+ should be connected to the generator side of the meter shunt, A- to the other side of the meter shunt, and V- to ground. If the meter has two terminals marked + and two terminals marked A- and V-, the jumper wire

should be connected to the other side of the meter shunt and V- to ground. If the terminals are marked V+, A+, V- and A- the jumper should be connected between V+ and A+ and these terminals connected to the generator side of the meter shunt. The terminal marked A- should be connected to the other side of the meter shunt and V- to ground.

h. Installation. Install voltmeters in the U-8G, RU-8D and U-8D (ASAC) as follows:

(1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position. Make sure external power source is disconnected. Disconnect battery.

(2) Connect wiring to proper terminals, making sure jumper wire is included from terminals A+ to V+.

NOTE

Replacement voltmeter terminal marking may differ from that of the meter that was removed. If the markings of the replacement meters are A+, A-, and V- (three terminals), A+ should be connected to the generator side of the meter shunt, A- to the other side of the meter shunt, and V- to ground. If the meter has two terminals marked + and two terminals marked A- and V-, the jumper wire should be connected to the other side of the meter shunt and V- to ground. If the terminals are marked V+, A+, V- and A- the jumper should be connected between V+ and A+ and these terminals connected to the generator side of the meter shunt. The terminal marked A- should be connected to the other side of the meter shunt and V- to ground.

(3) Position voltmeter in overhead instrument panel and secure with screws.

i. Installation. Install voltmeters in the U-8F as follows:

(1) Place BATTERY, BATTERY MASTER, and GENERATOR MASTER switches in OFF position and make sure external power source is disconnected. Disconnect battery.

(2) Install voltmeter in proper position with light assembly in left subpanel and secure with screws.

(3) Connect wiring to proper terminals, making sure jumper wire is included from terminals A+ to V+.

NOTE

Replacement voltmeter terminal marking may differ from that of the meter that was removed. If the markings of the replacement meters are A+, A-, and V- (three terminals), A+ should be connected to the generator side of the meter shunt, A- to the other side of the meter shunt, and V- to ground. If the meter has two terminals marked + and two terminals marked A- and V-, the jumper wire should be connected to the other side of the meter shunt and V- to ground. If the terminals are marked V+, A+, V- and A- the jumper should be connected between V+ and A+ and these terminals connected to the generator side of the meter shunt. The terminal marked A- should be connected to the other side of the meter shunt and V- to ground.

(4) Install left subpanel back plate.

CHAPTER 11

UTILITY SYSTEMS

SECTION I SCOPE

11-1. PURPOSE.

11-2. The purpose of this chapter is to provide all the essential information for maintenance personnel to accomplish organizational maintenance on the complete utility systems.

11-3. DESCRIPTION.

11-4. Utility systems are those systems within

the aircraft not directly contributing to flight, but enabling the aircraft to perform certain specialized functions. The systems included in this category are the heating and ventilating system (with engine preheat system), anti-icing system, deicing system, windshield wiper system (U-8F), and vacuum system. These systems are described in detail throughout this chapter.

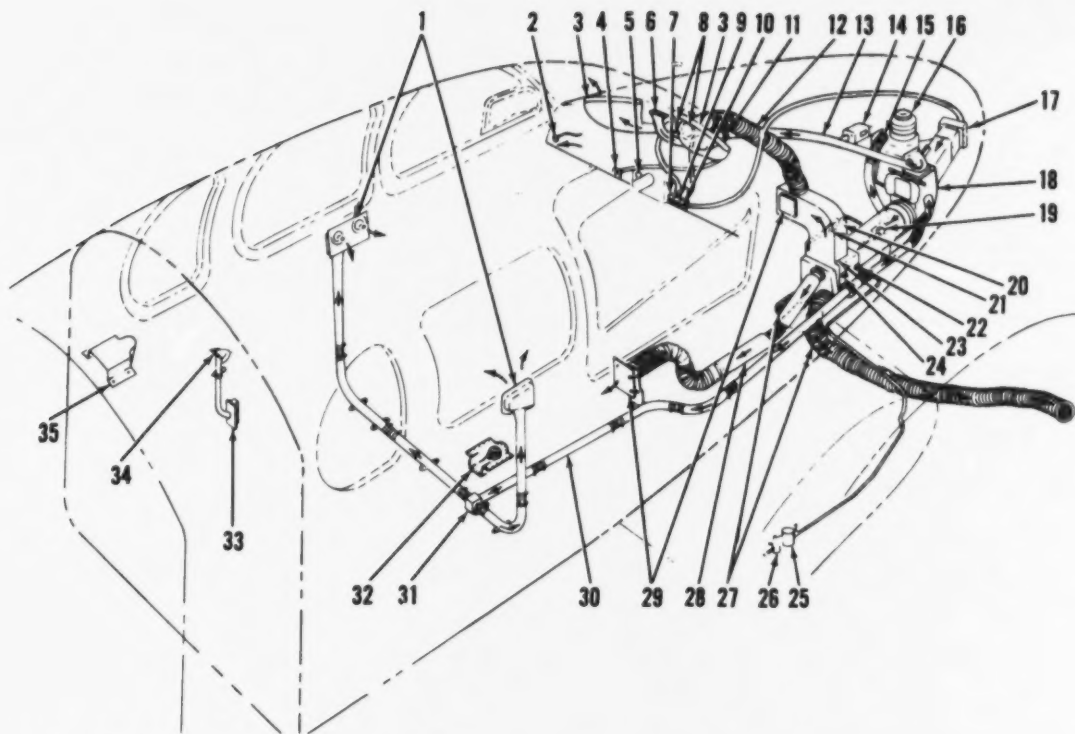
SECTION II HEATING AND VENTILATING

11-5. DESCRIPTION.

11-6. The flight compartment and cabin are provided with heating and ventilating capabilities. These capabilities are provided for by a heater, heater ignition unit, and a blower with necessary ducts, valves, and controls to regulate interior temperature. Heating controls are located on pilot's and copilot's subpanels. Fuel for the heater in the U-8D, U-8G, and RU-8D aircraft is supplied from the main right wing tank by an electrically driven fuel pump. Fuel for the heater in the U-8F aircraft is supplied under pressure from the left engine fuel pressure line. The U-8D, U-8G, and RU-8D aircraft ventilation system consists of a valve in the nose section, a push-pull front seat cold air control located just under the left subpanel to control cold air through a duct terminating at the windshield, and eyeball-type outlets to control cold air ducted to the rear seat cold air outlet installations. The U-8F aircraft ventilation system consists of a ventilation air valve located in the right-hand nose section, two push-pull cabin air controls located at each end of the subpanel controlling cold air to the pilot and copilot, and eyeball-type outlets to control air ducted to the cabin cold air outlets.

11-7. HEATING SYSTEM. (U-8D, U-8G, RU-8D)

11-8. The heating system (figures 11-1, 11-2, 11-3, and 11-4) consists primarily of a heater ignition unit, a heater, the heater fuel system, a fuel filter, a fuel transfer pump, fuel solenoid valves, a cabin air blower, heater ducts and outlets, switches, rheostats, and a thermostat. Ram air entering the ventilation air valve in the nose of the fuselage is used in the heating and ventilating system when the aircraft is in flight. The iris valve is controlled from the cabin by a push-pull control on the right-hand instrument subpanel, marked VENTILATION-HEATER AIR SHUT-OFF. For ground operation, an electrically driven blower supplies air for the system. From the blower or the iris valve, air is ducted through a 50,000 BTU, a combustion-type heater. The heater is mounted beneath the floorboard of the nose equipment compartment, to the right of the nose wheel well. Hot air from the heater enters a warm air plenum located on the aft wall of the nose equipment compartment. From the plenum, hot air is ducted to the rear seat outlet assembly, mounted on the aft side of the main-spar. The



- | | | |
|---|-----------------------------------|----------------------------------|
| 1. Cold air outlets | 11. Front seat control air valve | 24. Cycling thermostatic control |
| 2. HEATER-BLOWER circuit breaker | 12. Flexible defrosting duct | 25. Fuel transfer pump |
| 3. Y-shaped defrosting duct | 13. Cold air duct | 26. Fuel solenoid valve |
| 4. FRONT SEAT COLD AIR control | 14. Heater ignition unit | 27. Engine preheat ducts (U-8D) |
| 5. CABIN TEMP control rheostat | 15. Combustion air duct | 28. Warm air duct |
| 6. Cold air outlet | 16. Cabin air blower | 29. Warm air outlet assemblies |
| 7. PILOT'S DEFROSTER SHUT-OFF control | 17. Ventilation air valve | 30. Cold air duct |
| 8. Defroster shutoff valves | 18. Air intake plenum | 31. Box assembly |
| 9. COPILOT'S DEFROSTER SHUT-OFF control | 19. Heater | 32. Exhaust vent |
| 10. VENTILATION-HEATER AIR SHUT-OFF control | 20. Fuel solenoid valve | 33. Cabin thermostat |
| | 21. Fuel filter | 34. Thermostat vent |
| | 22. Overheat thermostatic control | 35. Exhaust vent |
| | 23. Warm air plenum | |

Figure 11-1. Heating, ventilating, and defrosting systems (U-8D and RU-8D)

front seat outlet assembly is located on the bulkhead between the cabin and nose equipment compartment, opening directly into the warm air plenum.

11-9. HEATER THERMOSTATS AND CONTROLS. (U-8D, U-8G, RU-8D)

11-10. The heater is turned on and the cabin temperature is selected with a CABIN TEMP

control rheostat (5, figure 11-1, or 11-3). This 5000-ohm rheostat will select cabin temperature in the range of 35° F (2° C) to 85° F (30° C). Selected cabin temperature is maintained by a cabin thermostat (33) which cycles a cabin temperature relay to energize and deenergize the heater ignition unit (14), the fuel solenoid valves (20), and the fuel transfer pump (25). Cycling the heater rapidly maintains a constant outlet temperature. The points of the cycling thermostatic control (24) open to turn the heater

off automatically when the temperature in the warm air plenum (23) reaches 200°F (93°C). When the plenum cools, the cycling thermostatic control points close to turn on the heater. Cabin temperature can also be controlled manually by rotating the CABIN TEMP control rheostat (5) to the full clockwise position. With the rheostat in this position, electrical current flows directly to the cycling thermostatic control (24), and the heater will run until the warm air plenum temperature reaches 200°F (93°C) or until the pilot manually turns the heater off. If, through a heater system malfunction, the plenum temperature reaches 300° (149°C), the overheat thermostatic control (22) closes, shorting a 5-ampere heater fuse to ground. This blows the fuse, shutting off the valves, and heater ignition unit. Both the heater (19) and cabin air blower (16) are controlled by a toggle switch type HEATER-BLOWER circuit breaker (2) located on the left-hand instrument subpanel. In normal operation, this circuit breaker is left ON at all times. The blower, intended for ground operation only, is controlled by a landing gear safety switch located on the right main landing gear strut; thus, when the gear is raised on takeoff, the blower

is switched off simultaneously. In flight ram air alone is sufficient for heating and ventilation. An additional switch, on the ventilation air valve control, turns off both the blower and heater when the control is pulled out more than halfway. The U-8D and RU-8 utilizes a relay which reduces high current through the landing gear control switch.

11-11. HEATER IGNITION UNIT.

11-12. The heater ignition unit (14, figure 11-1 or 11-3) mounted on the aircraft structure in the left side of the nose wheel well, supplies high voltage current to the heater igniter plug. The ignition unit consists of a high voltage output connection, low voltage connection, radio noise filter, resistor, vibrator, ignition coil, SPDT switch, buffer condenser, and a copper radio noise shield vibrator.

a. Removal. (1) Disconnect low voltage lead and heater ignition cable from forward side of heater ignition unit.

(2) Remove bolts, washers, and nuts securing heater ignition unit to left-hand nose wheel well structure.

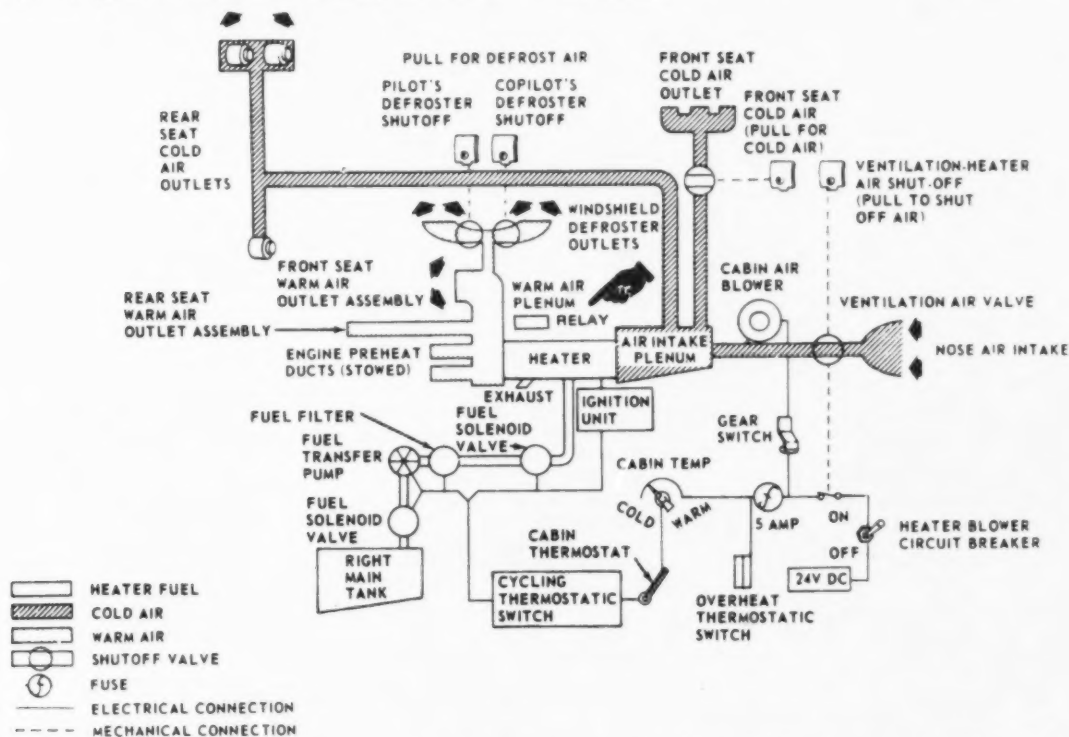


Figure 11-2. Heating, ventilating, and defrosting systems schematic (U-8D and RU-8D)

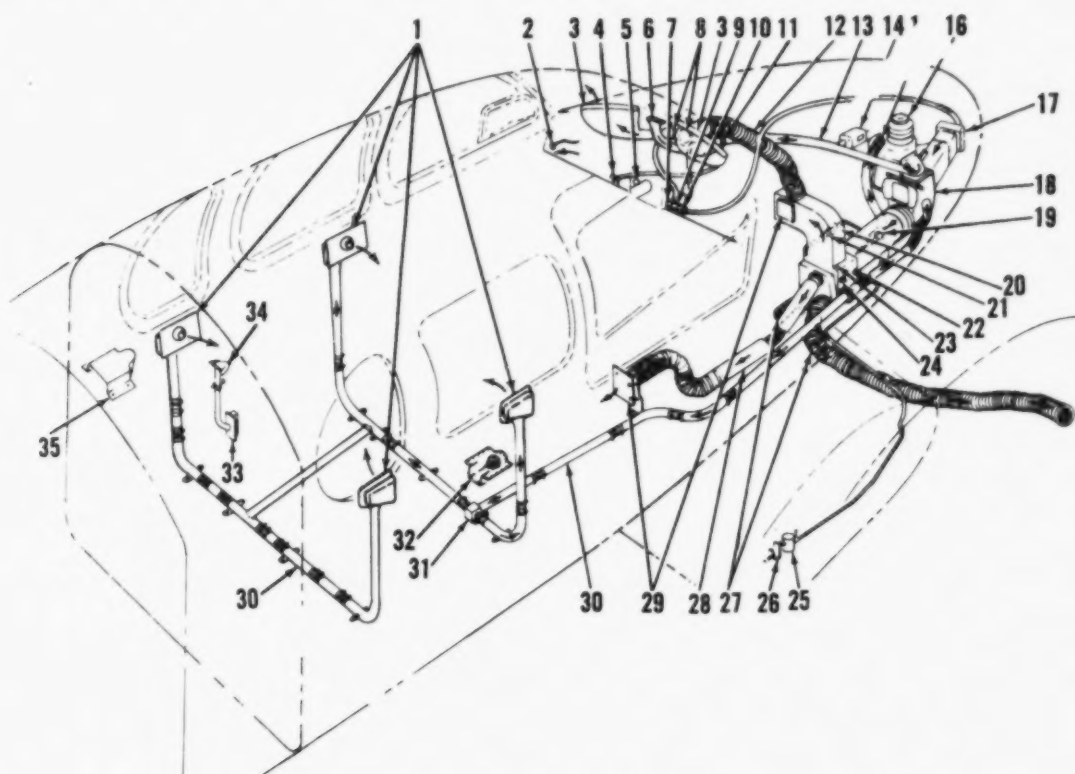
b. Cleaning. (1) Wipe heater ignition unit with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Dry heater ignition unit with compressed air.

c. Inspection. (1) Inspect heater ignition unit for cracks and corrosion.

(2) Inspect electrical connections for damaged threads.

d. Repair or replacement. Repair or replacement of loose or broken external connections



- | | | |
|---|-----------------------------------|----------------------------------|
| 1. Cold air outlets | 11. Front seat control air valve | 24. Cycling thermostatic control |
| 2. HEATER-BLOWER circuit breaker | 12. Flexible defrosting duct | 25. Fuel transfer pump |
| 3. Y-shaped defrosting duct | 13. Cold air duct | 26. Fuel solenoid valve |
| 4. FRONT SEAT COLD AIR control | 14. Heater ignition unit | 27. Engine preheat ducts |
| 5. CABIN TEMP control rheostat | 15. Combustion air duct | 28. Warm air duct |
| 6. Cold air outlet | 16. Cabin air blower | 29. Warm air outlet assemblies |
| 7. PILOT'S DEFROSTER SHUT-OFF control | 17. Ventilation air valve | 30. Cold air duct |
| 8. Defroster shutoff valves | 18. Air intake plenum | 31. Box assembly |
| 9. COPILOT'S DEFROSTER SHUT-OFF control | 19. Heater | 32. Exhaust vent |
| 10. VENTILATION-HEATER AIR SHUT-OFF control | 20. Fuel solenoid valve | 33. Cabin thermostat |
| | 21. Fuel filter | 34. Thermostat vent |
| | 22. Overheat thermostatic control | 35. Exhaust vent |
| | 23. Warm air plenum | |

Figure 11-3. Heating, ventilating, and defrosting systems (U-8G)

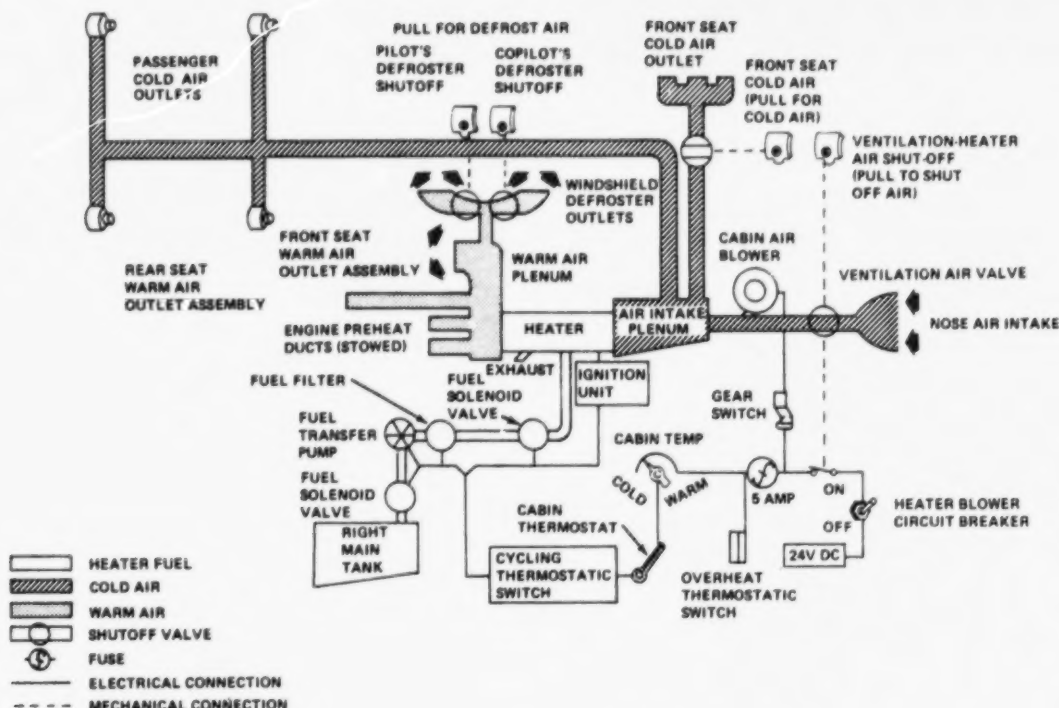


Figure 11-4. Heating, ventilating, and defrosting systems schematic (U-8G)

should be attempted only as a field expediency when higher echelon maintenance personnel are unavailable.

e. Installation. (1) Position heater ignition unit on left-hand nose wheel well structure and secure with mounting bolts, washers, and nuts.

(2) Connect ignition cable and low voltage lead to heater ignition unit.

11-12A. VIBRATOR.

The vibrator is equipped with two sets of contact points, normal and reverse. The SPDT switch (a push and pull selector type) is externally mounted on the ignition unit and is used for changing the contacts. The switch is secured in the IN position with lockwire at the factory to ensure that the vibrator will first be operated on the normal contacts. If the normal contacts fail, the lockwire should be cut and the switch pulled to the out position, causing the vibrator to operate on the reverse contacts. The vibrator should then be replaced as soon as possible.

(a) Removal. (1) Cut and remove locking wire from thumb nut on vibrator clamp assembly.

(2) Loosen the thumb nut on the vibrator clamp assembly, swing the clamp to one side and carefully lift the vibrator straight away from the vibrator socket. The pins should pull out of the socket contacts with ease.

(b) Installation. (1) Insert the vibrator carefully into the vibrator socket and swing the vibrator clamp assembly into position on the vibrator.

(2) Tighten the thumb nut on the vibrator clamp assembly and install locking wire in the nut to secure it.

11-13. HEATER. (U-8D, U-8G, RU-8D)

11-14. The 50,000 BTU heater (figure 11-5) is located beneath the floorboards on the right-hand side of the nose equipment compartment. The heater is essentially a cylindrical combustion chamber within a hollow radiator surrounded by a jacket. Incoming ventilation air passes between the combustion chamber and

the radiator, and between the radiator and the jacket, in a straight line for the full length of the heater. Fuel is sprayed from a nozzle at the forward end of the combustion chamber and ignited by an igniter plug which operates continuously when the cycling thermostat points are closed and the heater is in use. Combustion air, bled from the blower adapter is forced into the chamber at a tangent and mixed with the fuel spray, producing a swirling flame. The flame travels the full length spray, producing a swirling flame. The flame travels the full length of the combustion chamber

The hot gases are ducted to the radiator where they again travel the full length of the heater before being exhausted overboard. Fuel is supplied to the heater from the right main wing tank by an electric, fuel transfer pump mounted in the right wheel well. Fuel flow is shut off by two solenoid valves, one in the right wheel well and the other in the nose wheel well.

a. Troubleshooting. Troubleshooting consists of locating and correcting failure, leakage, or unsatisfactory operation of the heater. The following procedures list the most common troubles, probable causes, and possible remedies.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Cabin air blower runs but heater will not start	Blown fuse	Check for malfunction of cycling thermostat or grounded lead between over-heat thermostat and fuse.
	Faulty heater ignition unit vibrator	Switch to reserve vibrator contracts. If this corrects trouble, replace vibrator at first opportunity. (Refer to paragraph 11-11.)
	Fuel transfer pump inoperative	Disconnect discharge tube assembly from fuel transfer pump and check for flow. Replace defective pump. (Refer to paragraph 11-18.)
	One or both fuel solenoid valves inoperative	Disconnect fuel tube assembly and check for fuel flow; check valve in nacelle first. Replace defective valve. (Refer to paragraph 11-19.)
	Faulty heater ignition unit coil	Remove lead from igniter plug and hold so spark may jump to structure. If no spark, replace heater ignition unit. (Refer to paragraph 11-11.)
	Defective cabin thermostat, CABIN TEMP control rheostat, or defective cycling thermostat	Disconnect only the rear, or cycling thermostat, in the warm air plenum and tape the leads together. Disconnect cabin thermostat leads and touch them together. If heater remains off, replace CABIN TEMP control rheostat. If heater comes on, replace cabin thermostat. (Refer to paragraphs 12-125 and 12-127.) Replace wiring.
Cabin air blower does not operate heater-blower	Shorted or broken lead in blower circuit.	Check continuity. Replace defective wiring.
	Faulty cabin air blower, HEATER-BLOWER circuit breaker, landing gear control switch, or blower control relay.	Replace circuit breaker or landing gear control switch, or blower control relay. (Refer to paragraphs 12-21 or 12-97.) Replace blower. Notify direct support maintenance.
Neither heater nor cabin air blower will operate	HEATER-BLOWER circuit breaker tripped	Reset circuit breaker.
	Open circuit	Check continuity, right sub-panel bus to circuit breaker

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Heater backfires intermittently	Loose connection in control circuit. Loose high-tension lead to igniter plug Fuel mixture too rich	Check connections. Check wiring for breaks. Make checks outlined in following corrective action.
Exhaust smudges fuselage	Restriction in combustion air duct Restriction in exhaust duct	Check ventilation air valve and ducts for obstructions. Check exhaust outlet.
No spark	No power at input terminal Faulty igniter plug lead Faulty vibrator Heater otherwise inoperative	Check power circuit, wires, switches, and fuses, and close circuit. Install new lead. Change to reverse contract, or if this has already been done, install new vibrator. Install new heater. (Refer to paragraph 11-13.)

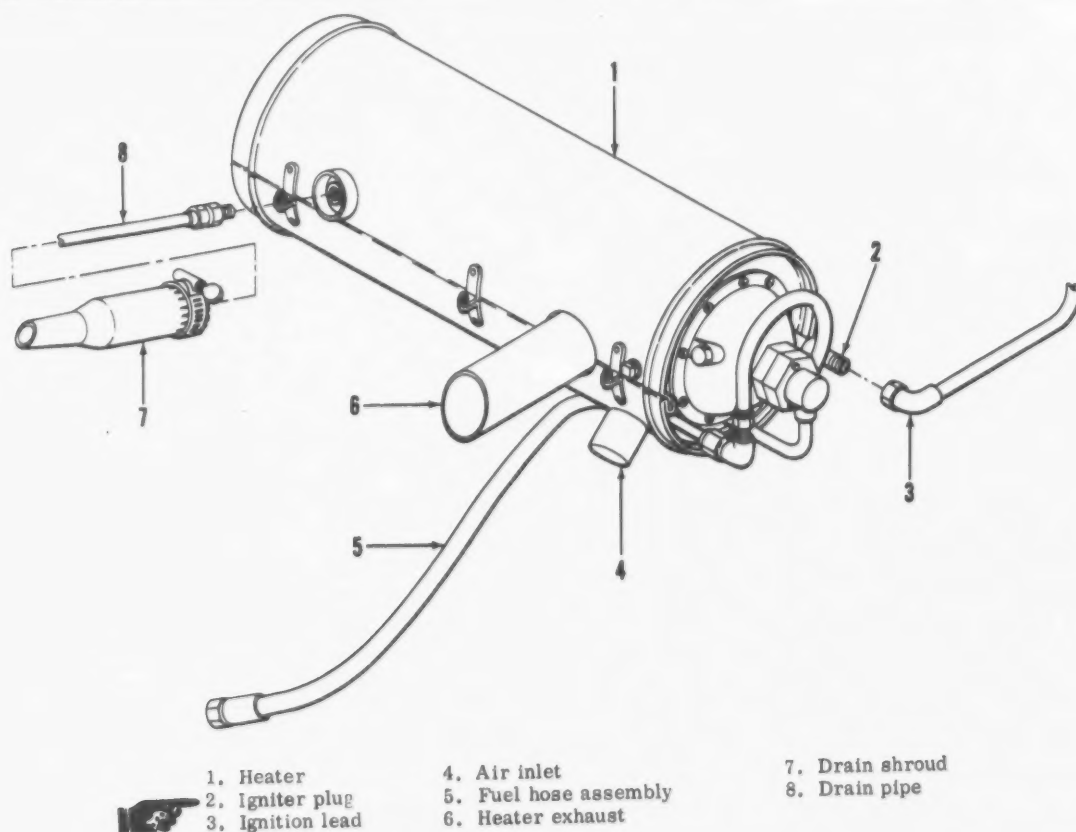


Figure 11-5. Heater (U-8D, U-8G, and RU-8D)

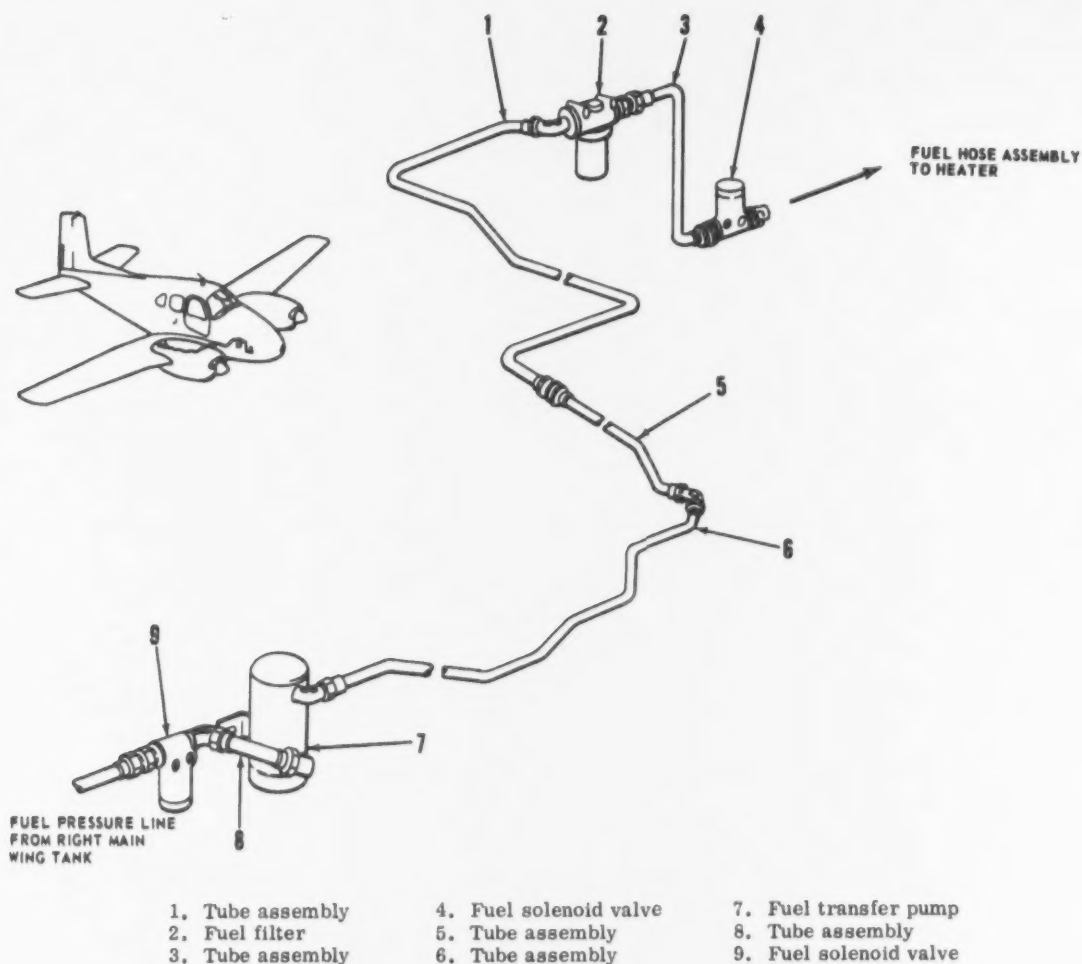


Figure 11-6. Heater fuel system (U-8D, U-8G, and RU-8D)

b. Removal. (1) Remove access cover from lower outboard side of forward bulkhead, in nose equipment compartment.

(2) Remove right-hand floorboard in nose equipment compartment and two floorboard supports from over heater.

(3) Disconnect ignition lead (3, figure 11-5) from igniter plug (2).

(4) Disconnect fuel hose assembly (5) from solenoid valve (4, figure 11-6) in nose wheel well. Pull hose assembly through grommet. Cap open valve port and hose fitting.

(5) Remove cover plate from right-hand side of nose wheel well. Detach rubber drain line from metal drain pipe (8, figure 11-5).

(6) Remove drain shroud (7) and drain pipe

(8) from bottom of heater (1).

(7) Disconnect combustion air duct from air inlet (4) on heater.

(8) Cut lock wire securing mounting clamps. Unfasten clamps and remove heater.

c. Cleaning. (1) Clean heater with dry cleaning solvent (item 6, table 1-8).

(2) Dry heater with compressed air.

d. Inspection. (1) Inspect ignition lead and fuel hose assembly for breaks, worn areas, and damaged threads.

(2) Replace broken, worn, damaged, or otherwise faulty items.

(3) Inspect heater for cracks and distortion. Replace heater if damaged.

e. Installation. (1) Position heater (1, figure

11-5) in lower right-hand side of nose compartment. Fasten mounting clamps and secure with lock wire.

(2) Connect combustion air duct to air inlet (4).

(3) Fasten drain pipe (8) and drain shroud (7) to heater (1).

(4) Insert rubber drain line over end of metal drain pipe (8). Install access plate on right-hand side of nose wheel well.

(5) Insert fuel hose assembly (5) through grommet. Remove caps and apply thread compound (item 44, table 1-8) to male threads.

(6) Connect fuel hose assembly (5) to solenoid valve (4, figure 11-6) in nose wheel well.

(7) Connect ignition lead (3, figure 11-5) to igniter plug (2).

(8) Install two floorboard supports over heater.

(9) Install right-hand floorboard in nose equipment compartment.

(10) Install access cover on lower outboard

side of the forward bulkhead in nose equipment compartment.

11-15. HEATER FUEL SYSTEM. (U-8D, U-8G, RU-8D)

11-16. Fuel is supplied to the heater from the right main wing tank by an electrical fuel transfer pump located in the right main wheel well. Fuel flow is controlled by two fuel solenoid valves, one in the right wheel well and the other in the nose wheel well. The fuel is cleaned of foreign matter by a fuel filter located in the nose wheel well, just aft of the solenoid valve. The fuel is sprayed from the heater fuel nozzle into the heater combustion chamber and ignited by the igniter plug. (See figure 11-6). Troubleshooting consists of locating and correcting failure, leakage, or unsatisfactory operation of the heater fuel system. The following procedures list the most common troubles, probable causes, and possible remedies.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Fuel transfer pump inoperative	Defective pump	Replace pump. (Refer to paragraph 11-18.)
	Loose electrical connection	Check continuity of circuits.
Fuel transfer pump operating	Fuel filter clogged and filter relief	Clean or replace filter. (Refer to paragraph 11-17.)
	Pump fuel filter clogged	Clean filter. (Refer to paragraph 11-18.)
	Fuel tubes clogged	Remove clogged tubes and clean with air pressure or replace with a new tube.
	Fuel solenoid valves inoperative	Check continuity. Replace defective valve. (Refer to paragraph 11-19.)

11-17. FUEL FILTER. The fuel filter (2, figure 11-6) is equipped with a relief valve which opens to maintain fuel flow if the filter element becomes clogged with foreign matter. The fuel filter is mounted on the right-hand side of the nose wheel well.

a. Removal. (1) Disconnect heater fuel tube assemblies (1 and 3, figure 11-6) from fuel filter (2) and cap all open fittings.

(2) Remove mounting screws, spacers, washers, and nuts. Remove filter.

b. Cleaning. Clean fuel filter and replace filter element as follows:

(1) Cut lock wire and unscrew bowl.

(2) Remove spring and filter element and packing preformed from bowl.

(3) Wash filter components in dry cleaning solvent (item 6, table 1-8). Dry with filtered, compressed air.

c. Inspection. (1) Inspect paper wafer fuel filter for foreign matter, broken wafers and insure rubber seal on top of filter is present.

(2) Inspect spring for distortion.

(3) Inspect filter bowl for cracks, dents and distortion.

(4) Inspect threads of bowl and housing for distortion.

d. Reassembly. (1) Place new packing preformed on filter bowl.

(2) Assemble spring and filter element in bowl.

(3) Install bowl in housing and tighten hand tight.

(4) Secure with lockwire.

e. Installation. (1) Position fuel filter (2, figure 11-6) on right-hand sidewall in nose wheel well. Secure with screws, spacers, washers, and nuts.

(2) Remove caps from fittings. Apply thread compound (item 44, table 1-8) to male threads, and connect tube assemblies (1 and 3) to fuel filter (2).

11-18. FUEL TRANSFER PUMP. The fuel transfer pump (7, figure 11-6) consists of a sealed motor, a plunger-type pump, a filter assembly, and a capacitor for radio interference suppression. A shielded cable connects the capacitor and pump motor. The pump is mounted on the inboard side of the right wheel well and is connected in series with the fuel solenoid valves (4 and 9), so that the valves and pump are energized simultaneously.

a. Removal. (1) Disconnect heater fuel tube assemblies (6 and 8, figure 11-6) from fuel transfer pump (7). Cap all open fittings.

(2) Disconnect electrical cable from fuel transfer pump and capacitor.

(3) Remove screws attaching fuel transfer pump and capacitor to mounting bracket.

(4) Remove pump and capacitor.

b. Cleaning. The electrical assembly of the fuel transfer pump is a sealed unit and not subject to repair. Repair of the unit is limited to cleaning dirt or other foreign matter from filter screen and bottom cavity of the pump. Cleaning is accomplished as follows:

(1) Using a 5/16 inch wrench, release bottom cover from bayonet fittings on the fuel transfer pump case.

(2) Remove filter screen carefully. Blow or wash clean, using dry cleaning solvent (item 6, table 1-8).

(3) Clean magnet, in center of bottom cover, with compressed air.

(4) Disassemble plunger spring cup by removing retainer screws.

NOTE

Use long nosed pliers to reposition valve assembly, if assembly falls out of cup. It will click when the assembly is properly seated.

(5) Pull plunger spring and plunger assembly from pump.

CAUTION

Do not drop or mutilate plunger. The buffer spring and valve must not be removed from plunger.

(6) Wash plunger assembly in dry cleaning solvent (item 6, table 1-8). If it does not wash clean or if there are any rough spots, gently dress plunger with crocus cloth.

(7) Slop pump assembly in dry cleaning solvent (item 6, table 1-8). If necessary, swab tube with a cloth wrapped stick.

(8) Reassemble pump. Using new gaskets and screws in plunger spring cup, if they are available.

c. Inspection. (1) Inspect fuel transfer pump for cracks, dents, distortion, and corrosion.

(2) Replace fuel transfer pump if damaged.

(3) Inspect electrical cable for broken insulation and defective connectors. Replace electrical cable if damaged.

d. Installation. (1) Position fuel transfer pump (7, figure 11-6) and capacitor on mounting bracket. Secure with screws.

(2) Connect electrical cable to fuel transfer pump (7) and capacitor.

(3) Remove caps from fittings. Apply thread compound (item 44, table 1-8) to male threads. Connect tube assemblies (6 and 8) to fuel transfer pump (7).

11-19. FUEL SOLENOID VALVES. The fuel solenoid valves (4 and 9, figure 11-6) are magnetic-type valves. When energized, the valve lifts off its seat allowing fuel to flow. When deenergized, the valve drops down and is held in the closed position by spring tension, shutting off the fuel flow. One fuel solenoid valve (9) is mounted on the inboard side of the right main wheel well, the other fuel solenoid valve (4) is mounted on the right side of the nose wheel well. The valves ensure that no fuel will seep into the heater combustion chamber when the heater system is OFF.

a. Removal. (1) Cut lock wire and remove caps from fuel solenoid valves (4 and 9, figure 11-6). Disconnect electrical leads.

(2) Disconnect tube assemblies from fuel solenoid valves (4 and 9). Cap all open fittings.

(3) Remove mounting screws, spacers, washers, and nuts. Remove fuel solenoid valves (4 and 9).

b. Cleaning. (1) Clean fuel solenoid valves with dry cleaning solvent (item 6, table 1-8).

(2) Dry fuel solenoid valves with compressed air.

c. Inspection. (1) Inspect fuel solenoid valves for cracks.

(2) Inspect fuel solenoid valves for damaged threads.

(3) Replace fuel solenoid valves if damaged.

d. Installation. (1) Position fuel solenoid valves (4 and 9, figure 11-6) in nose wheel well and right main wheel well, respectively. Secure with mounting screws, spacers, washers, and nuts.

(2) Remove caps from fittings. Apply thread compound (item 44, table 1-8) to male threads. Connect tube and hose assemblies to fuel solenoid valves.

(3) Connect electrical leads to fuel solenoid valves and install caps. Secure caps with lock wire.

11-20. FUEL SYSTEM TUBING. The fuel system tubing consists of tube assemblies (figure 11-6) routed from the right main wheel well through the wing and nose wheel well to the heater. Fuel is routed through a fuel pressure line from the right main wing tank to a fuel solenoid valve (9). A tube assembly (8) connects the fuel solenoid valve (9) to the fuel transfer pump (7). Tube assemblies (1, 5, and 6) connect the fuel transfer pump (7) to the fuel filter (2). A tube assembly (3) connects the fuel filter (2) to fuel solenoid valve (4) which is connected to the heater through fuel hose assembly (5, figure 11-5).

a. Removal. (1) Disconnect fuel tube assembly (8, figure 11-6) at solenoid valve (9) and fuel pump (7). Remove tube assembly.

NOTE

Cap all open fittings.

(2) Remove clamps securing tube assemblies (1, 5, and 6) between fuel pump (7) and fuel filter (2).

(3) Disconnect tube assembly (6) from fuel pump (7), and tube assembly (1) from fuel filter (2). Disconnect tube assembly (5) from tube assemblies (6) and (1). Remove tube assemblies.

(4) Disconnect tube assembly (3) from fuel filter (2) and solenoid valve (4). Remove tube assembly.

b. Cleaning. (1) Clean tube assemblies with dry cleaning solvent (item 6, table 1-8).

(2) Blow out tube assemblies with filtered compressed air.

c. Inspection. (1) Inspect tube assemblies for cracks, dents, and breaks.

(2) Replace damaged fittings and tube assemblies.

d. Installation. (1) Route tube assembly (3, figure 11-6) between solenoid valve (4) and fuel filter (2).

(2) Route tube assemblies (1, 5, and 6) between fuel filter (2) and fuel pump (7).

(3) Route tube assembly (8) between fuel pump (7) and solenoid valve (9).

(4) Remove caps from fittings and apply thread compound (item 44, table 1-8) to male fittings. Connect and secure all tube assemblies and fittings.

(5) Install all clamps and supports securing tube assemblies to aircraft.

11-21. HEATING DUCTS AND OUTLET ASSEMBLIES. (U-8D, U-8G, RU-8D)

11-22. The warm air duct (28, figure 11-1 or 11-3) consists of aluminum tubing and flexible hoses. The warm air duct (28) extends from the aft end of the warm air plenum (23), under the right-hand cabin floorboards to the cabin warm air outlet assembly (29) located on the aft side of the main spar. The cabin warm air outlet assembly (29) in the upper chamber of the warm air plenum (23) provides heat for the front seat occupants.

a. Removal. (1) Remove front seats in accordance with paragraph 4-60 or 4-114. Remove carpet, as required, in accordance with paragraph 4-82. Remove floorboards by removing screws.

(2) Loosen connecting clamps and remove warm air duct (28, figure 11-1 or 11-3) from aft warm air outlet assembly (29) and aft end of warm air plenum (23).

(3) Remove screws securing forward and aft warm air outlet assemblies (29).

(4) Remove outlet assemblies.

b. Cleaning. (1) Blow dirt out of ducts and flexible hoses with compressed air.

(2) Clean outside of aluminum ducts with clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(3) Wash outlet assemblies with dry cleaning solvent (item 6, table 1-8).

(4) Dry outlet assemblies with compressed air.

c. Inspection. (1) Inspect ducts and flexible hoses for cracks, breaks, and excessive chafing.

(2) Replace ducts and flexible hoses, if defective.

(3) Inspect warm air outlet assemblies for operation.

d. Installation. (1) Secure forward and aft warm air outlet assemblies (29, figure 11-1 or 11-3) with screws.

(2) Route warm air duct (28) between warm air plenum (23) and aft warm air outlet assembly (29).

(3) Install floorboards with screws. Install carpet in accordance with paragraph 4-82. Install front seats in accordance with paragraph 4-60 or 4-114.

11-23. CABIN AIR BLOWER. (U-8D, U-8G, RU-8D)

11-24. The cabin air blower (16, figure 11-1 or 11-3) furnishes fresh air for the heating and ventilating system while the aircraft is on the ground. Power for the blower is supplied through a control switch behind the instrument panel. The control switch permits operation of the blower when the landing gear handle is in the down position. The blower is mounted in the heating and ventilating intake duct in the right side of the nose wheel well.

11-25. EXTREME WEATHER MAINTENANCE. When the aircraft is parked or moored under extreme weather conditions such as those encountered in desert or extreme cold areas, precautions should be taken to protect the cabin air blower. Cover the nose gear wheel well and the outside air intake duct.

11-26. VENTILATING SYSTEM. (U-8D, U-8G, RU-8D)

11-27. (See figures 11-1, 11-2, 11-3, and 11-4.) When in flight, cold air for the cabin is supplied by ram air entering the air intake plenum (18, figure 11-1 or 11-3) through the ventilation air valve (17) installed in the nose of the aircraft. This valve is operated by a push-pull VENTILATION-HEATER AIR SHUT-OFF control (10) located on the right subpanel. Cold air is distributed from the air intake plenum (18) through cold air duct (13) to the windshield cold air outlet (6), and through cold air duct (30), located under the floorboards, to the aft cabin cold air outlets (1). U-8G aircraft are equipped with two additional cold air outlets to provide ventilation air for occupants of the aft passenger seats. A push-pull FRONT SEAT COLD AIR control (4) located on the left subpanel, opens and closes the front seat cold air valve (11) in cold air duct (13). Cold air

for the rear seat occupants is controlled by rotating the air outlets (1) in their sockets. The cabin air blower (16) supplies ventilating air through the ventilating system, when the aircraft is on the ground, and is operated by the HEATER-BLOWER circuit breaker (2) located on the left subpanel. An exhaust vent (32) is located on the underside of the fuselage approximately in line with the rear seat. There is also a cabin exhaust vent (35) on top of the fuselage.

11-28. VENTILATION AIR VALVE. (U-8D, U-8G, RU-8D)

11-29. The ventilation air valve (17, figure 11-1, or 11-3) is an iris type valve located in the ram air intake in the nose of the aircraft. It controls the flow of ram air to the heater and ventilating system. A push-pull VENTILATION-HEATER AIR SHUT-OFF control (10) on the right subpanel regulates the valve.

a. Removal. (1) Remove nose cone as described in paragraph 4-14.

(2) Remove screws, washers, and nuts attaching ventilation air valve (17, figure 11-1, or 11-3) and nose air intake screen to duct. Remove screen.

(3) Disconnect control wire and remove ventilation air valve (17).

NOTE

Before disconnecting control wire, place control in either full-open or full-closed position so it may be reinstalled without disturbing blower switch adjustment.

b. Cleaning. (1) Wipe ventilation air valve with clean cloth dampened with dry cleaning solvent (item 6, table 1-8). Wash screen in dry cleaning solvent.

(2) Dry with compressed air.

c. Inspection. (1) Inspect ventilation air valve and screen for cracks, dents, distortion, and corrosion.

(2) Replace ventilation air valve and screen if damaged.

d. Lubrication. Lubricate ventilation air valve with graphite (item 52, table 1-8). Oil should not be used on valve.

e. Installation. (1) Position ventilation air valve (17, figure 11-1 or 11-3) and install screws and nuts, but do not tighten.

(2) Connect control wire to actuator arm.

(3) Remove screws and nuts and position screen over ventilation air valve (17). Secure

screen and ventilation air valve with screws, washers and nuts.

NOTE

Accomplish adjustment (step f) before proceeding to step d.

(4) Install nose cone. (Refer to paragraph 4-14.)

f. Adjustment. The ventilation air valve (17, figure 11-1 or 11-3) incorporates a stop at the center of the valve to prevent air leakage when closed and to permit easier operation of the control. Adjust the control handle so that the blades of the valve are firmly seated on the stop when the control handle is pulled completely out.

11-30. PUSH-PULL CONTROLS. (U-8D, U-8G, RU-8D)

11-31. Push-pull controls (4, and 10, figure 11-1 or 11-3) open and close valves in the heating and ventilating system.

NOTE

Before disconnecting control wires to any valve, place control in either full-open or full-closed position so it may be reinstalled without disturbing valve adjustment.

a. Removal. (1) Disconnect control wire from valve.

(2) Remove clamps supporting control wire.

(3) Remove screw, locknut, and lockbutton from handle, and remove handle.

(4) Remove screws, washers, and nuts securing cam assembly, switch guide, and support assembly. Remove control wire and related parts.

b. Cleaning. (1) Wash control cable in dry cleaning solvent (item 6, table 1-8).

(2) Dry control cable with compressed air.

c. Inspection. (1) Inspect control cable and cover for binding, bent, or broken wires.

(2) Inspect cam assembly, switch guide, and support assembly for broken or bent parts.

d. Installation. (1) Position cam assembly, switch guide, and support assembly. Secure with screws, washers, and nuts.

(2) Route control cable between switch assembly and valve.

(3) Secure control wire to handle with screw, locknut, and lockbutton.

(4) Connect control cable to valve.

(5) Install supporting clamps.

11-32. VENTILATING DUCTS AND OUTLETS. (U-8D, U-8G, RU-8D)

11-33. The cold air duct (30, figure 11-1 or 11-3) consists of aluminum tubing and flexible hoses. Cold air duct extends from the outboard side of air intake plenum (18), under the right-hand floorboards to a box assembly (31), located under the rear seat floorboards. From the box assembly, the cold air duct is routed under the floorboards and behind the side panel upholstery to the cold air outlets (1), located under the windows. Cold air duct (13) is routed from the air intake plenum (18) to cold air outlet (6), located in the cabin just below the windshield. Two cabin exhaust vents (32) and (35) are located, one on top of the fuselage and the other underneath the fuselage.

a. Removal. (1) Remove seats in accordance with paragraphs 4-57, 4-60, 4-63, 4-114 and 4-120.

(2) Remove carpet as required, in accordance with paragraph 4-82.

(3) Remove upholstered side panels as required, in accordance with paragraph 4-71, 4-128, 4-170 and 4-200.

(4) Remove cabin floorboards by removing screws.

(5) Remove right-hand side floorboards in nose compartment by removing screws.

(6) Loosen connecting clamps and remove cold air duct (30, figure 11-1 or 11-3) from air intake plenum (18), box assembly (31), and cold air outlets (1). Remove screws and remove cold air outlets (1).

(7) Remove glare shield in accordance with paragraph 4-171.

(8) Loosen connecting clamps and remove cold air duct (13) from air intake plenum (18) and cold air outlet (6).

(9) Remove clamp and remove cold air outlet (6).

(10) Remove screens from exhaust vents (32) and (35).

b. Cleaning. (1) Blow dirt out of ducts, flexible hoses, and outlets with compressed air.

(2) Wash screens in dry cleaning solvent (item 6, table 1-8). Dry screens with compressed air.

(3) Wipe outside of ducts with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect ducts and flexible hoses for cracks, breaks, and excessive chafing.

(2) Inspect cold air outlets for operation.

(3) Inspect screens for damage.

d. Installation. (1) Install screens in exhaust vents (32, and 35, figure 11-1 or 11-3).

(2) Install cold air outlet (6) and secure with clamp.

(3) Attach cold air duct (13) to air intake plenum (18) and cold air outlet (6). Secure with clamps.

(4) Install glare shield in accordance with paragraph 4-171.

(5) Install cold air outlets (1) and secure with screws.

(6) Route cold air ducts (30) between air intake plenum (18), box assembly, and cold air outlets (1). Secure with clamps.

(7) Install floorboards and secure with screws.

(8) Install carpeting in accordance with paragraph 4-82.

(9) Install upholstered side panels in accordance with paragraph 4-71, 4-128, 4-170 and 4-200.

(10) Install seats in accordance with paragraphs 4-60, 4-63, 4-114 and 4-120.

11-34. ENGINE PREHEAT SYSTEM. (U-8D, U-8G)

11-35. The engine preheat system consists of two insulated flexible engine preheat ducts (27, figure 11-1 or 11-3). These ducts are attached to the aft end of the warm air plenum (23) and are stowed behind access doors on the underside of the fuselage. The open ends attach to blind plates that shut off the flow of heated air. To use, open preheat access doors, disconnect hoses from blind plates, and pull out the hoses. Connect hoses to the preheat duct opening on the inboard side of each engine nacelle. The hoses are fitted with quick disconnects. Refer to TM 55-1510-201-10 for complete engine preheating instructions. CABIN TEMP control rheostat (5, figure 11-1 or 11-3) should be turned to highest setting. After engines are preheated, disconnect hoses from nacelles and stow, connecting open ends to blind plates. Close access doors.

NOTE

Connect external electrical power to the aircraft electrical system during preheating of engines.

11-36. HEATING SYSTEM. (U-8F)

11-37. The heating system (figures 11-7 and 11-8) consists primarily of a heater ignition unit, a 100,000 BTU heater, the heater fuel system, fuel pressure regulator, fuel solenoid valves, heater temperature box control, cabin

air blower, blower control relay, vents, switches rheostats, and thermostat. The heating system is designed so air from both the ventilation air valve and the blower enters an air intake plenum, located beneath the front right-hand corner of the nose equipment compartment. From the air intake plenum, air is routed to the heater combustion chamber and heater radiator. Air flowing through the heater radiator is heated by contact with the radiator and routed to the warm air plenum attached to the aft end of the heater. From the warm air plenum, warm air is ducted through plastic ducts to four cabin warm air outlets. Fuel, under pressure, is supplied to the heater from the left-hand engine fuel pressure line. Two fuel solenoid valves in the fuel supply line prevent fuel from seeping into the heater when the heater is not being used. One valve is on the left-hand engine firewall, the other valve is located in the nose wheel well. The fuel solenoid valve in the nose wheel well is also used for cycling the heater. A fuel pressure regulator in the fuel supply line maintains the proper proportion of fuel and air entering the heater combustion chamber. A heater ignition unit, mounted above the heater, converts 28-volt dc to high voltage, pulsating current that produces a continuous spark inside the combustion chamber head. The fuel is ignited and produces a swirling flame that travels the length of the cylindrically shaped combustion chamber. Hot air and vapors from the combustion chamber are channeled into a radiator surrounding the combustion chamber. After traveling the length of the radiator, the air and vapors are discharged overboard through the heater exhaust shroud.

11-38. HEATER THERMOSTATS AND CONTROLS. (U-8F)

11-39. The HTR-BLOWER circuit breaker (9, figure 11-7) on the right instrument subpanel completes the electrical circuit to the cabin air blower if the landing gear is down. When the landing gear is retracted, a safety switch on the right-hand landing gear stops the blower, and ram air is then used in the heating and ventilating system. The cabin air blower may be used to provide fresh air with or without the heater operating, but the heater will not operate unless the blower is running or ram air is entering the air intake plenum. With the HTR-BLOWER circuit breaker (8) ON, the heater is turned on by the HTR-CONTROL circuit breaker (9).

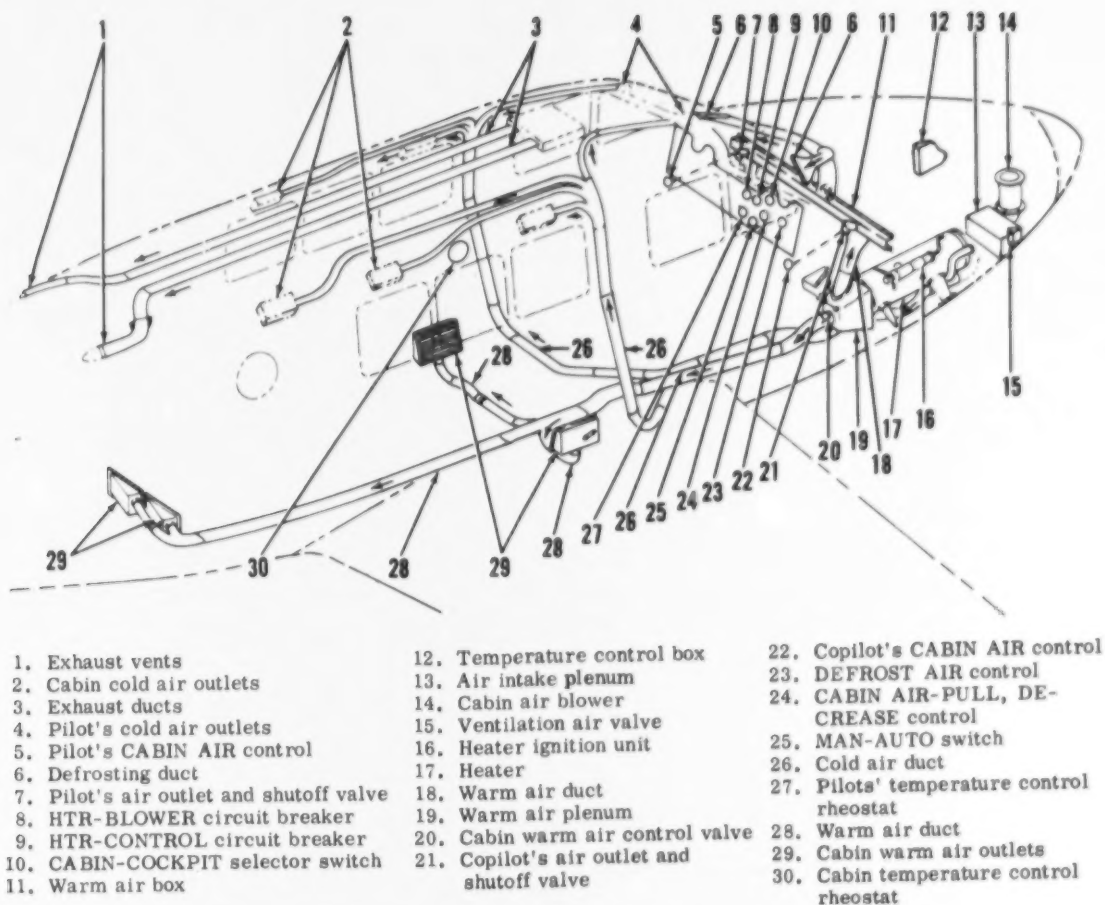


Figure 11-7. Heating, ventilating, and defrosting systems (U-8F)

Temperature in the cabin can be controlled either automatically or manually with a toggle switch, placarded MAN-AUTO, on the instrument subpanel. When the switch is in the AUTO position, the temperature is automatically controlled by a resistance bridge circuit. The heater discharge air sensing element located in the warm air plenum, the fresh air sensing element located in the air intake plenum, and either the cabin temperature control rheostat or the pilot's temperature control rheostat from the resistance bridge circuit. The CABIN-COCKPIT selector switch selects the temperature control rheostat that will be used in the resistance bridge circuit to control the cabin temperature. The cabin temperature control rheostat is located above the center right-hand window in the passenger's compartment. The pilot's temperature control rheostat is on the instrument subpanel. The resistance bridge circuit controls the

heater by completing the circuit between a power relay, in the temperature control box, and the fuel solenoid valve. When the fuel solenoid valve (cycling) in the nose wheel well is open, the heater will operate. When the fuel solenoid valve is closed, the heater will not operate. When the MAN-AUTO switch is in the manual position, the heater runs until it is manually shut off or until the warm air plenum reaches 200° F (93° C) and the temperature limiting switch fails to shut off the heater, an overheat thermostat in the warm air plenum will blow a 5-ampere fuse when the temperature in the plenum reaches 300° F (149° C). The 5-ampere fuse is located between the heater and blower circuit breaker and the heater control circuit breaker. Access to this 5-ampere fuse is gained through a small lighting hole under the right-hand instrument subpanel. The temperature limiting switch and the overheat thermostat have the

same effect, when the system is being controlled automatically, if the temperature reaches the limits of the switches. A cabin warm air control valve, downstream from the heater discharge opening, controls the flow of warm air through the cabin warm air outlets. This butterfly type valve is controlled by a push-pull linkage connected to the control handle on the subpanel. The control handle is placarded CABIN AIR. Manually operated damper valves control the warm air entering the flight compartment through an outlet above each set of rudder pedals. The push-pull controls for each outlet are below the subpanel at the extreme right and left side. Pushing the controls IN increase the flow of air pulling the controls OUT shuts off the air.

11-40. HEATER IGNITION UNIT. (U-8F)

11-41. The heater ignition unit (figure 11-9) is located beneath the right nose equipment compartment floorboard. The heater ignition

unit converts 28 volts dc from the aircraft electrical system to high voltage, pulsating current. The unit produces a continuous spark at the heater glow plug when the HTR-CONT circuit breaker is on. The heater ignition unit is composed of two radio noise filters, a condenser, relay, vibrator, vibrator socket, and an ignition coil. The vibrator contains two sets of contacts. The switch placarded, MAN-AUTO on the instrument subpanel, determines which set of contacts will operate.

a. Removal. (1) Remove right nose equipment compartment floorboards.

(2) Disconnect electrical connector (1, figure 11-9) from top of heater ignition unit (3).

(3) Disconnect high tension lead (2) from glow plug at forward end of heater ignition unit (3).

(4) Remove mounting clamps (4) and remove heater ignition unit (3).

b. Cleaning. (1) Wipe heater ignition unit with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Dry heater ignition unit with compressed air.

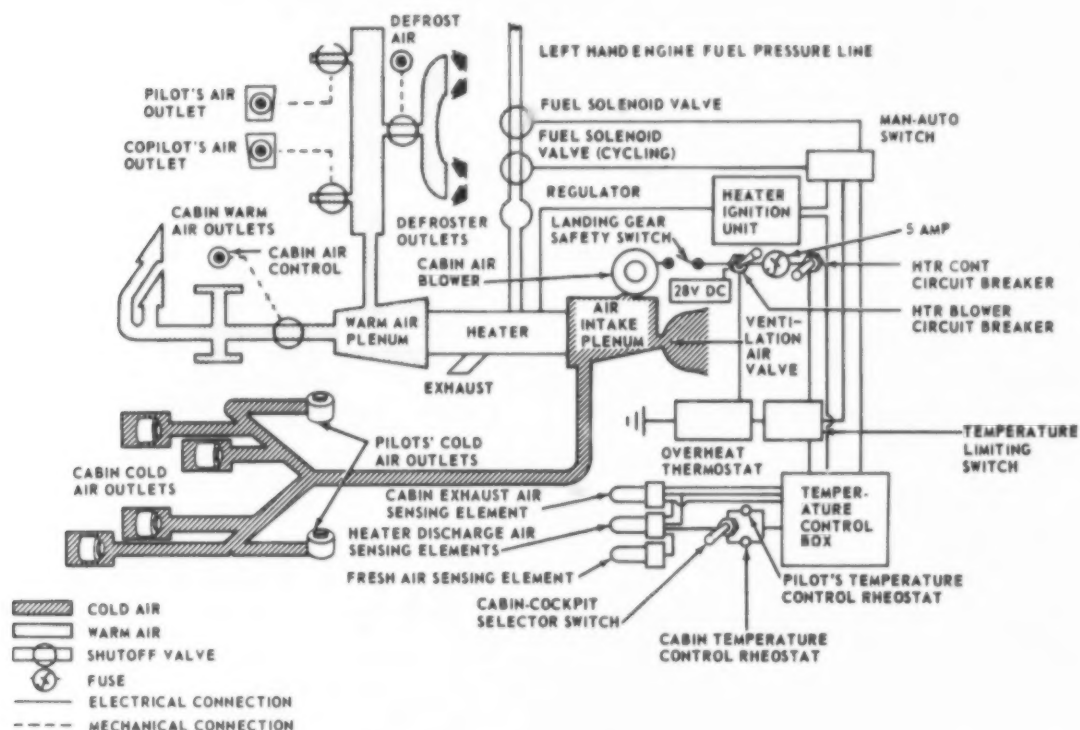
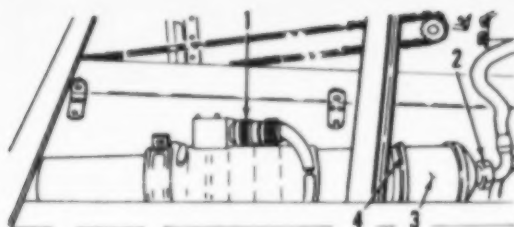


Figure 11-8. Heating, ventilating, and defrosting systems schematic (U-8F)



1. Electrical connector
2. High tension lead
3. Heater ignition unit
4. Clamp

Figure 11-9. Heater ignition unit (U-8F)

c. Inspection. (1) Inspect heater ignition unit for cracks and corrosion.

(2) Inspect electrical connections for damaged threads.

d. Repair or replacement. Repair or replacement of loose or broken connections should be attempted only as a field expediency when higher echelon maintenance personnel are not available.

e. Installation. (1) Position heater ignition unit (3, figure 11-9) and install mounting clamps (4).

(2) Connect electrical connector (1) and high tension lead (2) to heater ignition unit (3) and igniter plug.

(3) Install floorboard.

11-42. HEATER.(U-8F)

11-43. The heater, (17, figure 11-7) is located beneath the floorboards on the right-hand side of the nose equipment compartment. The 100,000 BTU heater is comprised of a cylindrical combustion chamber within a hollow radiator, surrounded by a sheet metal jacket. Incoming air from the fresh air plenum passes between the combustion chamber and the radiator, and between the radiator and the jacket, in a straight line for the full length of the heater. Fuel is sprayed into the forward end of the combustion chamber and is ignited by a igniter plug which operates continuously when the heater is in use. Combustion air from the fresh air plenum is forced into the combustion chamber at a tangent and is mixed with the fuel spray to produce a swirling flame. The flame travels to the aft end of the combustion chamber where the hot gases from the flame are channeled into the radiator. The hot gases travel forward the full length of the radiator and are exhausted overboard through the heater exhaust shroud. Fuel is supplied to the heater from the left-hand engine fuel pressure line. Fuel flow is controlled by the fuel pressure regulator.

a. Troubleshooting. Troubleshooting consists of locating and correcting failure, leakage, or unsatisfactory operation of the heater. The following procedures list the most common troubles, probable causes, and possible remedies.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Cabin air blower does not operate	Shorted or broken lead in the blower circuit	Make circuit continuity check. Replace defective wiring.
	Faulty blower, heater and blower circuit breaker switch, or landing gear safety switch	Replace circuit breaker switch or landing gear safety switch. (Refer to paragraphs 12-21 or 12-97.)
		Replace blower. Notify direct support maintenance.
Heater inoperative when MAN-AUTO switch is in MAN position	Reserve contacts in heater ignition unit are defective	Replace heater ignition unit. (Refer to paragraphs 11-40.)
	Open circuit between temperature limiting switch and MAN-AUTO switch, or between MAN-AUTO switch and ignition unit	Make circuit continuity check. Replace defective wiring.
	Faulty MAN-AUTO switch	Replace MAN-AUTO switch. (Refer to paragraphs 12-17.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Heater inoperative when MAN-AUTO switch is in AUTO position	Shorted or broken lead in temperature control circuit	Make circuit continuity check. Replace defective wiring.
	Faulty temperature control box	Replace temperature control box. (Refer to paragraph 11-51.)
	Faulty temperature control rheostats, or MAN-AUTO switch	Replace control rheostat. (Refer to paragraph 12-127.)
	Normal contacts in the ignition unit are defective	Replace MAN-AUTO switch. (Refer to paragraphs 12-17.)
Heater inoperative with MAN-AUTO switch in either position	Insufficient fuel:	Replace ignition unit. (Refer to paragraph 11-40.)
	Low fuel supply pressure	Refer to Chapter 5.
	Faulty fuel pressure regulator or fuel solenoid valves	Replace fuel pressure regulator. (Refer to paragraph 11-46.) Replace solenoid valves. (Refer to paragraph 11-47.)
	Air lines to fuel pressure regulator clogged	Remove obstruction.
	Fuel lines clogged	Remove obstruction.
	Open circuitry from temperature limiting switch to the MAN-AUTO switch or from the MAN-AUTO switch to either fuel solenoid valve	Make circuit continuity check. Replace defective wiring.
	Ignition system failure:	
	Faulty shielded lead or heater ignition unit	Replace shielded lead or heater ignition unit. (Refer to paragraph 11-40.)
	Lack of power to heater system:	
	Fuse blown	Replace fuse in lead between heater and blower circuit breaker and heater control circuit breaker.
	Faulty heater control circuit breaker	Replace heater control circuit breaker. (Refer to paragraph 12-21.)
	Open circuit between heater control circuit breaker and temperature limiting switch	Make circuit continuity check. Replace defective wiring.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Backfiring, pulsating combustion, or smoking exhaust	Cabin air blower not operating	Start blower in accordance with TM 55-1510-201-10.
	Insufficient combustion air:	
	Leaks or obstructions in air tube assembly	Remove obstructions or replace tube assembly.
	Fuel pressure regulator defective	Replace fuel pressure regulator. (Refer to paragraph 11-46.)
	Air lines to fuel pressure regulator clogged	Remove obstructions.
	Restriction in heater exhaust shroud	Remove restrictions.
	Insufficient combustion air	Check air tube assembly for leaks or obstructions.

b. Removal. See figure 11-10 for removal of heater.

c. Cleaning. (1) Clean heater with dry cleaning solvent (item 6, table 1-8).

(2) Dry heater with filtered compressed air.

d. Inspection. (1) Inspect high tension lead and fuel tube assemblies for damaged threads and breaks.

(2) Replace broken, worn, damaged, or otherwise faulty items.

(3) Inspect heater for cracks and distortion. Replace heater if damaged.

e. Installation. See figure 11-11 for installation of heater.

11-44. HEATER FUEL SYSTEM. (U-8F)

11-45. The heater fuel system (figure 11-12), consists primarily of fuel solenoid valves, fuel pressure regulator, and fuel, air, and exhaust tube assemblies. Fuel is supplied to the heater under pressure from the left-hand engine fuel pressure line.

11-46. FUEL PRESSURE REGULATOR. The fuel pressure regulator (7, figure 11-12) is located on the front bulkhead of the nose wheel well. It controls the flow of fuel to the heater so that the ratio of fuel to air entering the heater will be maintained at a constant value. Combustion air, at heater inlet pressure, and exhaust pressure are applied to a diaphragm inside the regulator. The diaphragm operates a valve inside the regulator which controls the fuel pressure. A minimum air loading differential of 1.0 inches water is required before

the valve in the regulator will open. Consequently, the heater will not operate unless air is entering the air intake plenum from the cabin air blower or the ventilation air valve.

a. Removal. (1) Disconnect fuel tube assemblies (1 and 9, figure 11-12), air tube assembly (8), and exhaust tube assembly (10) from fuel pressure regulator (7). Cap all open fittings.

(2) Remove mounting screws and remove fuel pressure regulator (7) from mounting bracket.

b. Cleaning. (1) Clean fuel pressure regulator with dry cleaning solvent (item 6, table 1-8).

(2) Dry fuel pressure regulator with filtered compressed air.

c. Inspection. (1) Inspect fuel pressure regulator for cracks, dents, and distortion.

(2) Inspect fittings and ports for damaged threads.

(3) Replace fuel pressure regulator if damaged.

d. Installation. (1) Position fuel pressure regulator (7, figure 11-12) on mounting bracket in nose wheel well and secure with mounting screws.

(2) Remove caps from fuel tube assemblies (1 and 9). Apply thread compound (item 44, table 1-8) to male threads. Connect fuel tube assemblies to fuel pressure regulator (7).

(3) Remove cap from air tube assembly (8). Apply anti-sieze compound (item 45, table 1-8) to male threads. Connect air tube assembly to fuel pressure regulator (7).

(4) Remove caps from exhaust tube assembly (10). Apply thread compound (item 44, table 1-8) to male threads. Connect exhaust tube assembly to fuel pressure regulator (7).

11-47. FUEL SOLENOID VALVES. Two fuel solenoid valves (2, figure 11-12), one located on the left-hand engine firewall, and one in the nose wheel well, are used to prevent fuel from seeping into the heater when the heater is inoperative. The valve in the nose wheel well is used to cycle the heater.

a. Removal. (1) Cut lock wire and remove caps from fuel solenoid valves (2, figure 11-12). Disconnect electrical leads.

(2) Disconnect fuel tube assemblies (1, 3, 8, and 11, figure 11-12) from fuel solenoid valves (2), and cap all open fittings.

(3) Remove bolts (4), washers (5), and spacers (6), and remove fuel solenoid valves (2).

b. Cleaning. (1) Clean fuel solenoid valves (2) with dry cleaning solvent (item 6, table 1-8).

(2) Dry fuel solenoid valves with filtered, compressed air.

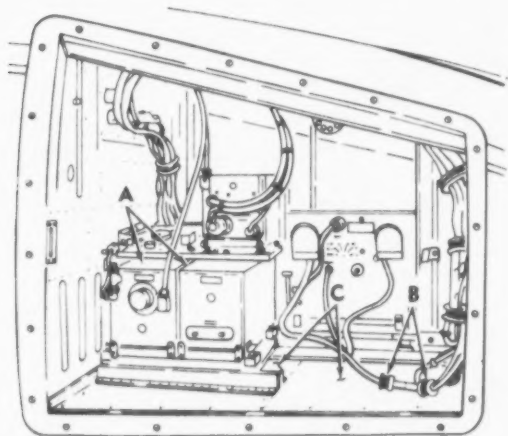
c. Inspection. (1) Inspect fuel solenoid valves for cracks and corrosion.

(2) Inspect fuel solenoid valves for damaged threads.

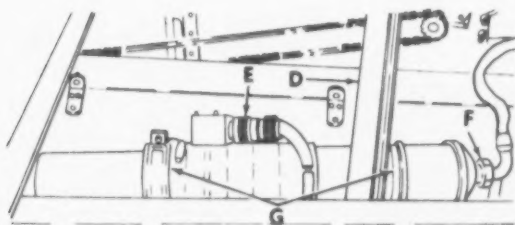
(3) Replace fuel solenoid valves if damaged.

d. Installation. (1) Position fuel solenoid valves (2, figure 11-12) in nose wheel well and on left-hand engine firewall. Secure with mounting bolts (4), washers (5), and spacers (6).

(2) Remove caps from fittings. Apply thread compound (item 44, table 1-8) to male threads.

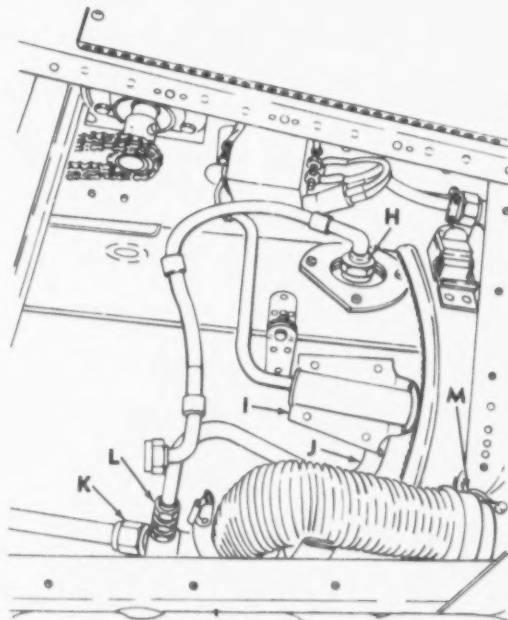


1 REMOVE RADIO EQUIPMENT (A), WIRE HARNESS CLAMPS (B), AND FLOOR BOARDS (C) FROM RIGHT-HAND SIDE OF NOSE EQUIPMENT COMPARTMENT.



2 REMOVE CROSS MEMBER (D).

DISCONNECT ELECTRICAL CONNECTOR (E), HIGH TENSION LEAD (F), AND MOUNTING CLAMPS (G) AND REMOVE HEATER IGNITION UNIT FROM AIRCRAFT.



3 DISCONNECT HIGH TENSION LEAD (H) FROM GLOW PLUG.

REMOVE FUEL LINE COVER (I) AND DISCONNECT FUEL TUBE ASSEMBLY FROM HEATER.

DETACH FUEL OVERFLOW HOSE (J) FROM HEATER FUEL FITTING.

DISCONNECT AIR TUBE ASSEMBLIES (K) AND (L) FROM TEE FITTING.

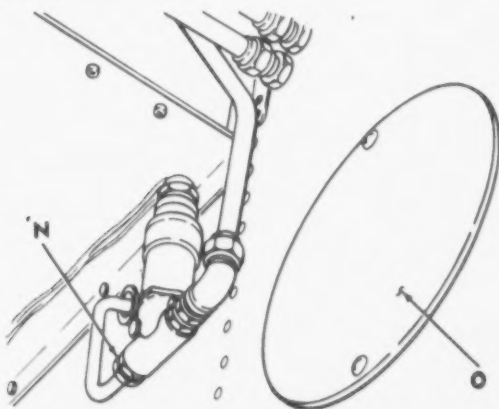
LOOSEN CLAMP (M) AND DETACH COMBUSTION AIR INTAKE HOSE FROM AIR INTAKE PLENUM FITTING.

Figure 11-10. Heater removal (U-8F) (sheet 1 of 2)

Connect fuel tube assemblies (1, 3, 9, and 11) to fuel solenoid valves (2).

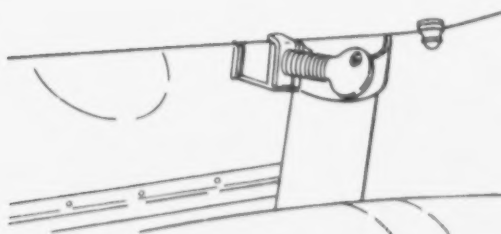
(3) Connect electrical leads to fuel solenoid valves (2) and install caps; secure caps with lock wire.

11-48. FUEL SYSTEM TUBING. The fuel system tubing consists of fuel, air, and exhaust tube assemblies (figure 11-12) routed from the heater. Fuel system tubing originates under the right-hand floorboards in the nose equipment compartment and is routed to the forward end of the nose wheel well, where the fuel pressure regulator, a fuel tube assembly is routed to a solenoid valve, mounted on the left-hand engine firewall.



4 DISCONNECT FUEL TUBE ASSEMBLY (N) FROM FUEL SOLENOID VALVE (CYCLING) IN HOSE WHEEL WELL AND WITHDRAW TUBE ASSEMBLY.

REMOVE ACCESS PLATE (D) TO PERMIT ACCESS TO HEATER DRAIN TUBE.



5 LOOSEN HEATER DRAIN CLAMP AND DETACH HEATER DRAIN TUBE FROM HEATER.

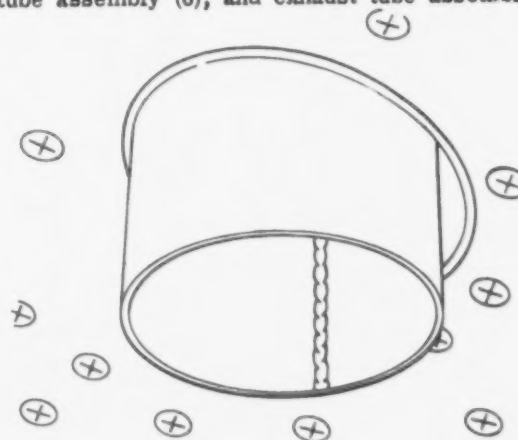
a. Removal. (1) Disconnect fuel tube assemblies (1 and 3, figure 11-12) at solenoid valve (2), mounted on left-hand engine firewall. Disconnect fuel tube assembly (3) at fuel pump tee fitting. Remove fuel tube assembly.

NOTE

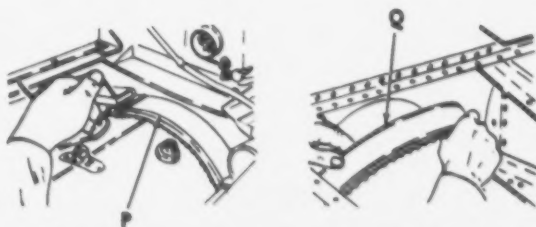
Cap all open fittings.

(2) Remove clamps securing fuel tube assembly (1) between solenoid valve (2), mounted on firewall, and fuel pressure regulator (7). Disconnect fuel tube assembly (1) at fuel pressure regulator. Remove fuel tube assembly.

(3) Disconnect fuel tube assembly (9), air tube assembly (8), and exhaust tube assembly



6 REMOVE HEATER EXHAUST SHROUD RETAINING SCREWS.



7 REMOVE FORWARD HEATER RETAINING STRAP (P) AND LOOSEN AFT RETAINING STRAP (Q).

LIFT HEATER FROM AIRCRAFT.

Figure 11-10. Heater removal (U-6F) (sheet 2 of 2)

(10) at fuel pressure regulator (7).

(4) Remove clamps and supports securing fuel, air, and exhaust tube assemblies between regulator and heater.

(5) Disconnect air tube assembly (8) and exhaust tube assembly (10) from heater. Remove tube assemblies.

(6) Disconnect fuel tube assemblies (9 and 11) from solenoid valve (2), mounted in nose wheel well, and disconnect fuel tube assembly (11) from heater. Remove fuel tube assemblies (9 and 11).

b. Cleaning. (1) Clean tube assemblies with dry cleaning solvent (item 6, table 1-8).

(2) Blow out tube assemblies with filtered, compressed air.

c. Inspection. (1) Inspect tube assemblies for cracks, dents, and damaged fittings.

(2) Replace damaged fittings and tube assemblies.

d. Installation. (1) Route fuel tube assembly (11, figure 11-12) between heater and solenoid valve (2), mounted in nose wheel well.

(2) Route fuel tube assembly (9) between solenoid valve (2), mounted in nose wheel well, and fuel pressure regulator (7).

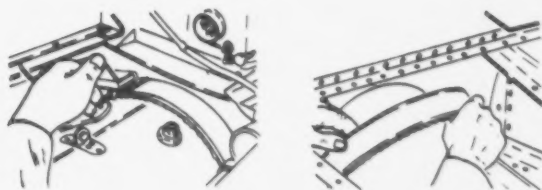
(3) Route air tube assembly (8) and exhaust tube assembly (10) between heater and fuel pressure regulator (7).

(4) Route fuel tube assembly (1) between fuel pressure regulator (7) and solenoid valve (2), mounted on firewall.

(5) Route fuel tube assembly (3) between solenoid valve (2), mounted on firewall, and fuel pump tee fitting.

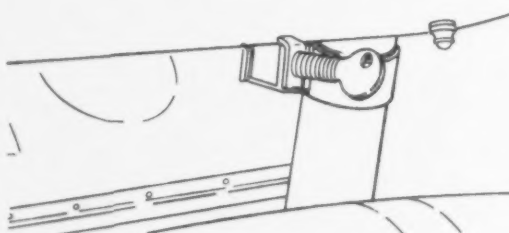
(6) Remove caps from fittings and apply thread compound (item 44, table 1-8) to male fittings. Connect and secure all fittings.

(7) Install all clamps and supports securing tube assemblies to aircraft.

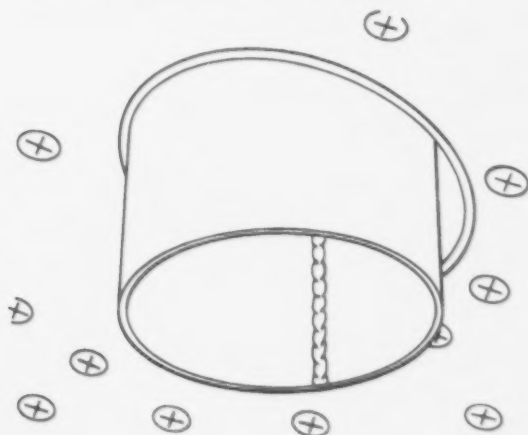


1 ALIGN EXHAUST SHROUD WITH CUTOUT IN FUSELAGE SKIN AND POSITION HEATER IN HEATER COMPARTMENT.

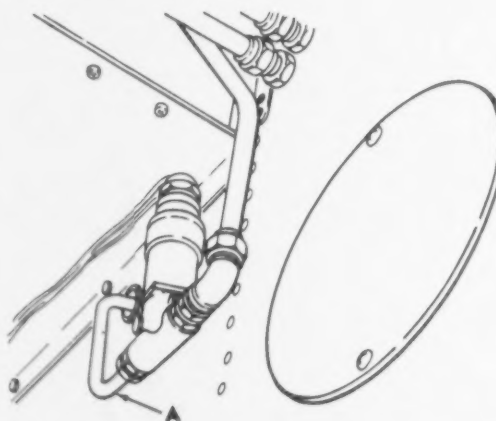
2 INSTALL HEATER RETAINING STRAPS.



3 INSTALL HEATER DRAIN TUBE TO HEATER.



4 INSTALL HEATER EXHAUST SHROUD RETAINING SCREWS.



5 INSTALL HEATER FUEL TUBE ASSEMBLY (A) TO FUEL SOLENOID VALVE (CYCLING) IN NOSE WHEEL WELL.

Figure 11-11. Heater installation (U-8F) (sheet 1 of 2)

11-49. HEATING DUCTS AND OUTLETS. (U-8F)

11-50. The warm air duct (28, figure 11-7) is installed under the floor webs and is routed to four cabin warm air outlets (29). The flight compartment warm air duct (18) is attached to the top of the warm air plenum (19) and is routed to a warm air box (11) located behind the subpanels. The pilot's and copilot's warm air outlets project out and downward from the warm air box (11).

a. Removal. (1) Remove copilot's seat in accordance with paragraph 4-159.

(2) Remove passenger seats in accordance with paragraph 4-191.

(3) Remove seat tracks by removing screws.

(4) Remove carpeting, as required, in accordance with paragraphs 4-175.

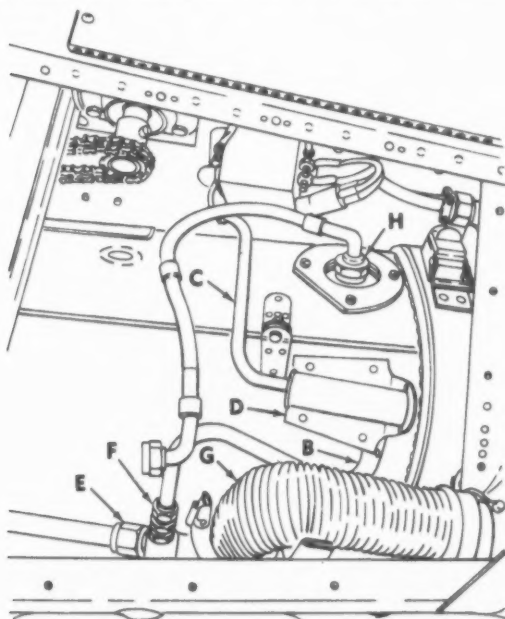
(5) Remove floor webs and inspection plates in flight compartment and cabin compartment, as required, by removing screws.

(6) Remove clamps securing warm air ducts (18 and 28, figure 11-7) to cabin warm air outlets (29), warm air plenum (19), warm air box (11), and aircraft structure.

(7) Remove warm air duct (28) from warm air plenum (19) and cabin warm air outlets (29). Remove duct from aircraft.

(8) Remove cabin warm air outlets (29) by removing screws.

(9) Remove warm air duct (18) from warm air plenum (19) and warm air box (11) behind right subpanel.



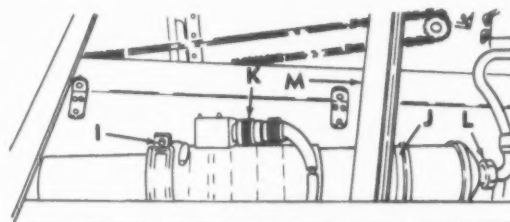
6 CONNECT FUEL OVERFLOW HOSE (B) TO HEATER FUEL FITTING.

CONNECT FUEL TUBE ASSEMBLY (C) TO HEATER. PACK SEALANT (ITEM 51 TABLE 1-7) AROUND FITTING AND INSTALL COVER (D).

INSTALL AIR TUBE ASSEMBLY (E) AND (F) TO TEE FITTING.

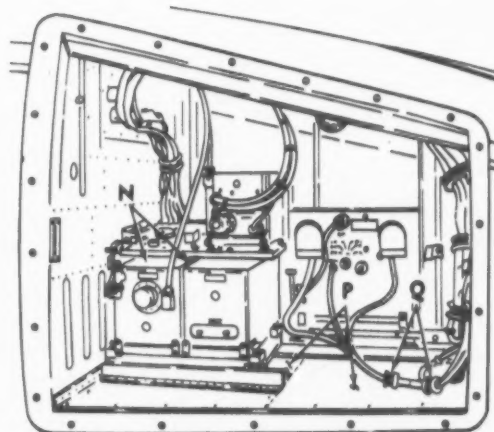
INSTALL COMBUSTION AIR INTAKE HOSE (G).

FASTEN HIGH TENSION LEAD (H) TO HEATER GLOW PLUG.



7 POSITION HEATER IGNITION UNIT ABOVE HEATER AND INSTALL CLAMPS (I) AND (J). CONNECT ELECTRICAL CONNECTION (K) AND HIGH TENSION LEAD (L) TO HEATER IGNITION UNIT.

INSTALL CROSS MEMBER (M).



8 INSTALL NOSE EQUIPMENT COMPARTMENT FLOORBOARDS (P), RADIO EQUIPMENT (N), AND WIRE HARNESS CLAMPS (Q).

Figure 11-11. Heater installation (U-8F) (sheet 2 of 2)

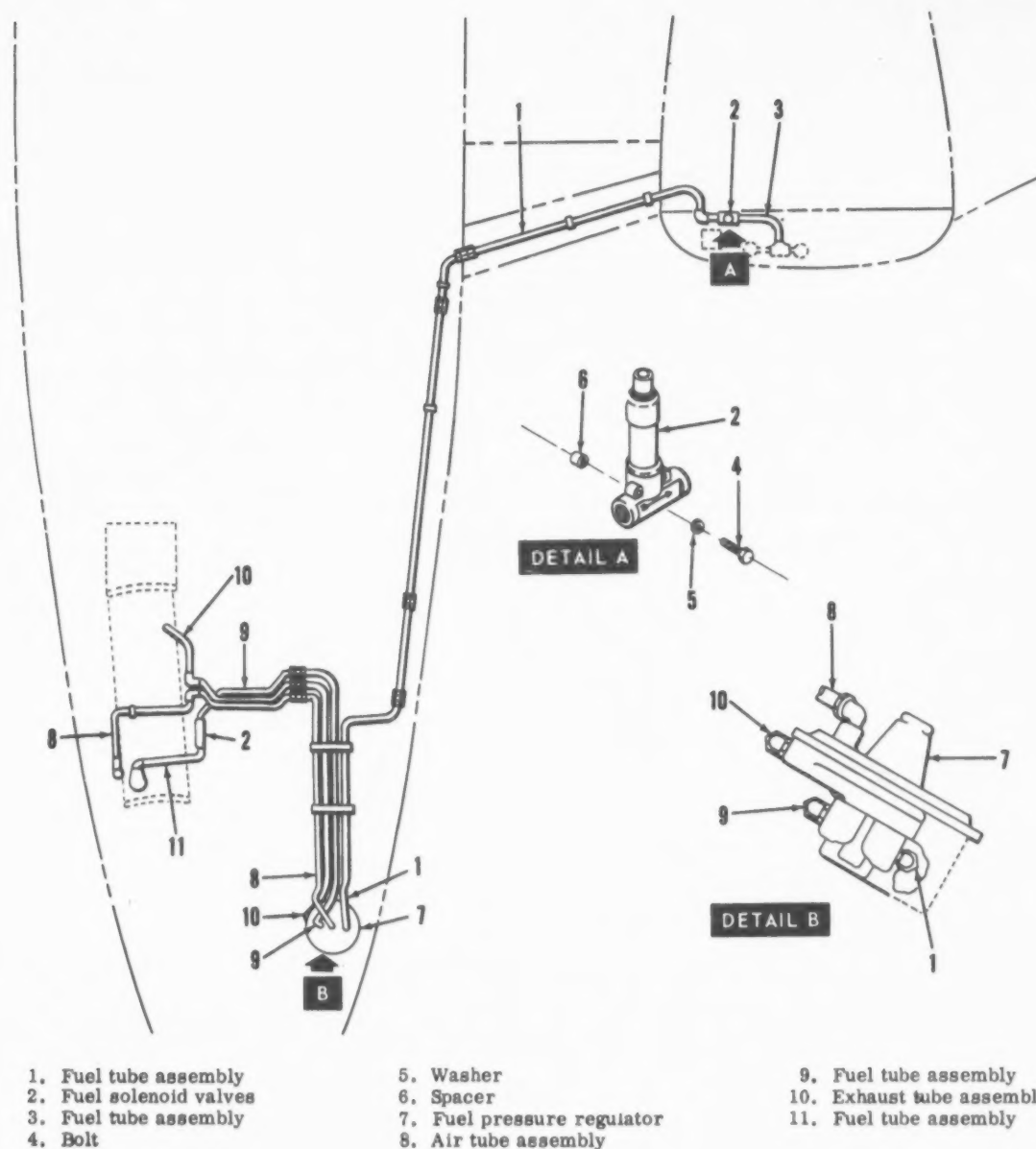


Figure 11-12. Heater fuel system installation (U-8F)

b. Cleaning. (1) Wipe outside of warm air ducts with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Blow out warm air ducts and outlets with compressed air.

c. Inspection. (1) Inspect warm air ducts for cracks and broken areas.

(2) Inspect outlets for operation.

d. Installation. (1) Attach warm air duct (18, figure 11-7) to warm air plenum (19) and warm air box (11).

(2) Install warm air outlets (29) and secure with screws.

(3) Attach warm air duct (28) to cabin warm air outlets (29) and to warm air plenum (19).

(4) Install all clamps removed in step a (6).

(5) Install floor webs and inspection plates. Secure with screws.

(6) Install carpeting in accordance with paragraph 4-175.

(7) Install seat tracks and secure with screws.

(8) Install passenger seats in accordance with paragraph 4-191.

(9) Install copilot's seat in accordance with paragraph 4-159.

11-51. TEMPERATURE CONTROL BOX. (U-8F)

11-52. The heater temperature control box (figure 11-13) is located in the front, right-hand corner of the nose equipment compartment. It automatically cycles the heater to maintain the temperature selected with the flight compartment or the cabin temperature control rheostat. The relative resistance of the cabin exhaust air sensing element, the heater discharge air sensing element, the outside air sensing element, and the operative temperature control rheostat are used in a resistance bridge circuit. When the temperature around one of the sensing elements changes, the resistance from that element changes, causing the contacts of an ultra-sensitive relay to close. The closed relay contacts allow current from a power relay to energize the fuel solenoid. When the cabin reaches the selected temperature, the bridge circuit balances, the bridge relay contacts open, and the fuel solenoid closes.

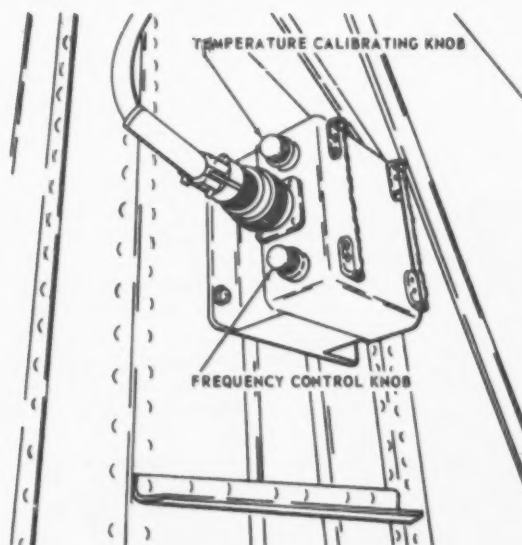


Figure 11-13. Heater temperature control box adjustment (U-8F)

a. Removal. (1) Disconnect electrical plug from control box.

(2) Remove mounting screws.

b. Cleaning. (1) Wipe control box with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Dry control box with compressed air.

c. Inspection. (1) Inspect control box for cracks and corrosion.

(2) Inspect electrical connection for damaged threads.

d. Installation. (1) Position control box in front, right-hand corner of nose equipment compartment.

(2) Attach control box to fuselage with screws.

(3) Connect electrical plug.

e. Adjustment. The temperature and the frequency calibration knobs on the temperature control box should be set as follows: (Refer to figure 11-13.)

(1) TEMP INCR - Rotate clockwise until closed.

(2) FREQ INCR - Rotate clockwise until closed, then back one-fourth turn.

11-53. CABIN AIR BLOWER, (U-8F)

11-54. The cabin air blower (14, figure 11-7) furnishes fresh air for the aircraft's heating and ventilating system when the aircraft is on the ground. Power for the blower is supplied through the blower control relay, located in the heater compartment below the nose equipment compartment floorboards. The relay is actuated by the landing gear safety switch, located on the right main landing gear strut, which will not allow the blower to operate when the landing gear shock strut is extended. The axial flow, fan-type blower is mounted in the fresh air intake duct, in the right-hand side of the nose wheel well.

a. Removal. (1) Disconnect blower electrical leads.

(2) Remove retaining clamps from screen above blower.

(3) Remove screen.

(4) Remove blower retaining screws. Remove blower.

b. Cleaning. (1) Wipe blower with clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Clean fan with compressed air.

c. Inspection. (1) Inspect blower for cracks and corrosion.

(2) Check that fan rotates freely.

(3) Inspect electrical connections for damage.

d. Installation. (1) Position blower with blade up and terminal plate facing in an aft inboard direction.

(2) Secure blower with mounting screws.

(3) Attach sponge rubber gaskets to blower adapter and vent adapter with a small amount of glue. This is done to hold gaskets in place while blower screen is being installed.

(4) Position blower screen and install screen retaining clamps.

(5) Connect blower electrical leads.

e. Extreme Weather Maintenance. When the aircraft is parked or moored under extreme weather conditions such as those encountered in desert or extreme cold areas, precautions should be taken to protect the cabin air blower. Cover the nose gear wheel well and the outside air intake duct.

11-55. BLOWER CONTROL RELAY. (U-8F)

11-56. The blower control relay is mounted in the heater compartment under the equipment compartment floorboards. The 25-ampere, SPST relay is controlled by the landing gear safety switch.

a. Removal. (1) Remove right-hand nose equipment compartment access panel.

(2) Remove necessary radio equipment and remove floorboards from the right side of nose equipment compartment.

(3) Disconnect electrical leads from relay.

(4) Remove relay mounting screws. Remove relay.

d. Cleaning. (1) Wipe control relay with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Dry control relay with compressed air.

c. Inspection. (1) Inspect control relay for cracks and corrosion.

(2) Inspect electrical connections for damage.

d. Installation. (1) Position relay and install mounting screws.

(2) Connect electrical leads.

(3) Install nose equipment floorboards.

(4) Install any radio equipment that was removed.

(5) Install nose equipment compartment access panel.

11-57. VENTILATING SYSTEM. (U-8F)

11-58. (See figures 11-7 and 11-8). When in flight cold air for the flight compartment and cabin is

supplied by ram air entering an air intake plenum (13, figure 11-7) and is distributed through a cold air duct (26), which is attached to the air intake plenum (13). When the aircraft is on the ground, a cabin air blower (14) supplies ventilating air through the ventilating system. The blower is operated by the toggle switch HTR-BLOWER circuit breaker (8), located on the right-hand subpanel. The flow of cold air into the flight compartment and cabin is controlled by rotating the cold air outlets in their sockets.

11-59. VENTILATING DUCTS AND OUTLETS. (U-8F)

11-60. The cold air duct (26, figure 11-7) is installed under the right-hand flight compartment floor webs and splits to each side at the approximate center of the cabin compartment. The cold air ducts are routed up each side of the cabin compartment, behind the upholstered panels, to cabin cold air outlets (2). Two cold air outlets (4) are located in the ceiling, permits exit of exhaust air through two exhaust air ducts (3) routed aft along the ceiling to outside exhaust vents (1).

a. Removal. (1) Remove copilot's seat in accordance with paragraph 4-159.

(2) Remove forward passenger seats, if required, in accordance with paragraph 4-191.

(3) Remove copilot's seat tracks by removing screws.

(4) Remove carpeting, where required, in accordance with paragraph 4-206.

(5) Remove ceiling upholstery from flight and cabin compartments in accordance with paragraphs 4-169 and 4-199.

(6) Remove right-hand floor webs in flight compartment, center floor web, and necessary inspection plates from cabin compartment by removing screws.

(7) Remove necessary upholstered side panels in cabin compartment in accordance with paragraph 4-200.

(8) Remove clamps securing cold air ducts (26, figure 11-7) and exhaust ducts (3) to exhaust vents (1), outlets (2 and 4), and air intake plenum (13).

(9) Remove cold air and exhaust ducts from aircraft.

(10) Remove cabin cold air outlets (2) by removing screws.

(11) Remove screens from exhaust vents (1).

b. Cleaning. (1) Blow dirt out of ducts and outlets with compressed air.

(2) Wipe outside of ducts with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(3) Wash screens in dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect ducts for cracks and broken areas.

(2) Inspect outlets for operation.

(3) Inspect screens for damage.

d. Installation. (1) Install screens in exhaust vents (1, figure 11-7).

(2) Install cabin cold air outlets (2) and secure with screws.

(3) Route cold air ducts (26) and exhaust ducts (3) between inlets and outlets.

(4) Secure ducts with clamps.

(5) Install floor webs and inspection plates, and secure with screws.

(6) Install upholstery in accordance with paragraphs 4-169 and 4-199.

(7) Install copilot's seat tracks and secure with screws.

(8) Install carpeting in accordance with paragraph 4-206.

(9) Install passengers seats in accordance with paragraph 4-191.

(10) Install copilot's seat in accordance with paragraph 4-159.

11-61. PUSH-PULL CONTROLS (U-8F)

11-62. The push-pull controls (5, 22, and 24, figure 11-7) open and close valves in the ventilating system.

NOTE

Before disconnecting control wire from any valve, place control in either full-open or full-closed position, so it may be reinstalled without disturbing valve adjustment.

Maintenance of the push-pull controls is accomplished in accordance with 11-31.

11-63. ENGINE PREHEAT SYSTEM. (U-8F)

11-64. The engine preheat system consists of two insulated flexible hoses and an adapter. The hoses and adapter are stored in a stowage box in the aft baggage compartment when not in use. The flexible hoses are fitted with quick disconnects for easy installation and removal. The hose for the right engine is 84 inches long and the left engine hose is 108 inches long. The preheat connection for each engine is covered by a small access door on the lower inboard side of the nacelle. The adapter is plugged into the heater discharge plenum connection, exposed after opening the access door on the right side of the belly. The preheat system may be prepared for operation by plugging the adapter into the heater plenum and attaching the flexible hoses to the nacelle openings and the adapter. When the hoses are connected, the heater may be turned on. The rheostat that is regulating the cabin thermostat should be turned up to increase the heat delivered to the engines.

NOTE

Connect external electrical power to the aircraft's electrical system during preheating of engines.

SECTION III ANTI-ICING AND DEICING SYSTEM

11-65. DESCRIPTION.

11-66 All aircraft are provided with separate anti-icing and deicer systems. The anti-icing system is an electrically controlled system utilizing a pump to distribute anti-icing fluid to the propellers and windshield to reduce ice accumulation. The deicer system removes ice accumulations from wing and stabilizer leading edges through the flexing action of rubber deicer boots induced by alternately applied pressure and vacuum.

11-67. ANTI-ICING SYSTEM DESCRIPTION.

11-68. The anti-icing system (figure 11-14) supplies anti-icing fluid to the propeller blades to reduce ice accumulation on the blades during flights through icing conditions. The system consists of a supply tank, filter, check valves, solenoid valve, pump, fluid quantity transmitter, fluid quantity gage, circuit breaker, control rheostat, anti-icing rings, and anti-icing feed shoes. In addition to propeller anti-icing, U-8F aircraft incorporate windshield anti-icing. Refer

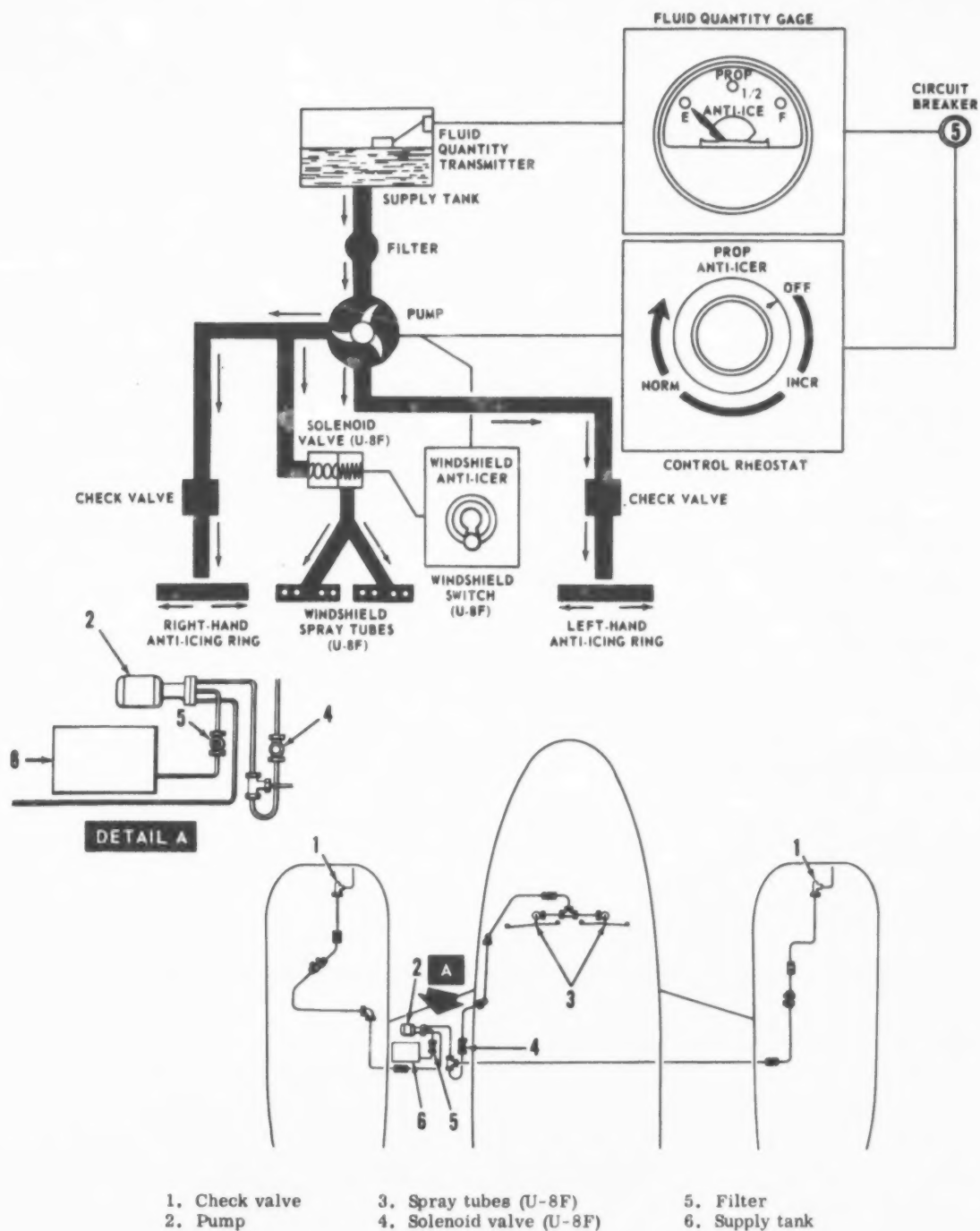


Figure 11-14. Anti-icing system

to paragraph 1-150 for servicing instructions. The anti-icing supply tank is located in the left-hand wing between the fuselage and nacelle. The fluid quantity transmitter, installed in the supply tank, is connected to a fluid quantity gage located on the right-hand side of the instrument panel on U-8D, U-8G, and RU-8D aircraft and on the left-hand subpanel on U-8F aircraft. The anti-icing pump and filter are located in the left-hand wing near the supply tank. Two discharge lines carry anti-icing fluid from the pump to check valves mounted above each engine nose case. A third discharge line is used on U-8F aircraft, to carry fluid to the windshield spray tubes. The check valves have adjustable springs which regulate the flow of fluid. The fluid passes through each check valve to an anti-icing ring attached to the propeller spinner bulkhead. From the anti-icing rings, fluid is forced through a metal tube to anti-icing feed shoes on each propeller blade. Longitudinal ribs on the boots distribute the fluid over the blade surfaces. Fluid for windshield anti-icing is sprayed onto the windshield by spray tubes located under each side of the windshield. A single discharge line, connected to the right-hand propeller discharge line by a tee fitting, feeds both spray tubes. A solenoid valve, operated by

a toggle switch on the right-hand side of the instrument panel, controls the flow of fluid. When the spring-loaded toggle switch is held in the ON position, the pump operates at maximum speed and the solenoid valve opens.

NOTE

During operation of windshield anti-icing, the right-hand propeller receives no fluid.

The anti-icing circuit breaker and control rheostat are on the subpanel. The rheostat is used to adjust the rate of fluid discharge, by controlling the speed of the pump motor.

CAUTION

Do not attempt to remove ice from the propeller blades by operating the anti-icing system if the ice has been formed in any way other than in flight.

Troubleshooting consists of locating and correcting failure, leakage, or unsatisfactory operation of the anti-icing system. The following procedures list the most common troubles, probable causes, and possible remedies.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No fluid being delivered	Tube assemblies clogged	Disconnect tube assemblies at pump, and blow out with air hose.
	Check valve inoperative	Adjust check valve. (Refer to paragraph 11-71.)
	Solenoid valve inoperative (U-8F only)	Replace solenoid valve. (Refer to paragraph 11-72.)
	Pump inoperative	Refer to next step.
Pump inoperative	Circuit breaker tripped	Reset circuit breaker.
		Replace circuit breaker. (Refer to paragraph 12-21.)
	Open circuit	Check circuit continuity.
	Poor ground	Check ground connection at pump motor.
	Pump motor defective	Replace pump. (Refer to paragraph 11-73.)

11-69. SUPPLY TANK. The anti-icing supply tank (5, figure 11-14) is located in the left-hand wing between the fuselage and nacelle, just forward of the main spar. It is a 3-gallon, aluminum tank. Rubber insulated metal straps secure the tank to the tank support cradles. A fluid quantity transmitter assembly is installed in the tank to operate the fluid quantity gage.

a. Removal. (1) Open leading edge access door from beneath left-hand wing.

(2) Drain anti-icing fluid from system by removing cap from tee fitting on bottom side of supply tank (6, figure 11-14).

(3) Remove tube assembly from tee fitting on supply tank.

(4) Disconnect bonding jumper from wing.

(5) Disconnect ground wire to scupper.

(6) Remove hoses attaching scupper drain tube and vent tube to supply tank.

(7) Cut lock wire on thumb screws of support straps, loosen thumb screws, and unroll straps. Pull tank straps clear and lower supply tank enough to disconnect electrical lead attached to supply tank fluid quantity transmitter. Remove supply tank.

b. Cleaning. (1) Clean exterior of supply tank with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Allow supply tank to air-dry and remove residue with a clean dry cloth.

c. Inspection. (1) Inspect supply tank for dents and leaks.

(2) Inspect rubber chafe strips on support straps for tears and wear.

d. Repair or replacement. (1) Replace rubber chafe strips if torn or badly worn.

(2) Replace defective supply tank.

e. Installation. (1) Place supply tank (6, figure 11-14) in position.

(2) Connect electrical lead to fuel quantity transmitter.

(3) Connect ground wire to scupper drain tube.

(4) Attach scupper drain tube and vent tube to supply tank.

(5) Hold supply tank up snug against cradle, with filler neck on outboard side. Pull straps around tank and insert ends of straps through thumb screws.

(6) Roll strap ends under. When straps are tight enough around tank, tighten thumb screws and secure with lock wire.

(7) Attach bonding jumper to wing.

(8) Connect tube assembly to tee fitting.

(9) Install drain cap on tee fitting beneath supply tank and refill tank. (Refer to paragraph 1-150).

(10) Close leading edge access door.

11-70. FILTER. The anti-icing filter (4, figure 11-14) is located in the line between the supply tank and pump. It is constructed with a machined, aluminum alloy bowl and cap, synthetic rubber and cork gasket, and a filter element.

a. Removal. (1) Open leading edge access door from beneath left-hand wing.

(2) Disconnect tube assemblies from filter (5, figure 11-14). Cap all open fittings.

(3) Loosen retaining clamp and remove filter.

b. Cleaning. (1) Clean filter with dry cleaning solvent (item 6, table 1-8).

(2) Dry filter with compressed air.

c. Inspection. (1) Inspect filter for cracks.

(2) Inspect fittings for damaged threads.

(3) Unscrew filter bowl from filter cap; unscrew filter element from filter cap; and inspect filter for cleanliness.

(4) Fasten filter element to filter cap finger-tight.

(5) Assemble filter gasket and filter bowl to filter cap. Check for leakage.

d. Repair or replacement. (1) Replace dirty or damaged filter elements.

(2) Replace damaged gaskets.

e. Installation. (1) Install filter (5, figure 11-14) in retaining clamp with the side stamped OUT, facing forward.

(2) Remove caps and connect tube assemblies to filter.

(3) Close leading edge access door.

11-71. CHECK VALVES. The anti-icing check valves (1, figure 11-14) are located in the anti-icing discharge lines between the pump and slinger rings. They are adjusted to restrict the rate of flow of anti-icing fluid while the system is operating, and to prevent seepage from the discharge lines while the system is inoperative.

a. Removal. (1) Open engine cowling doors.

(2) Disconnect tube assemblies from check valves (1, figure 11-14). Cap all open fittings.

(3) Remove check valves.

b. Cleaning. (1) Clean check valves with dry cleaning solvent (item 6, table 1-8).

(2) Dry valves with compressed air.

c. Inspection. (1) Inspect valves for cracks.

(2) Inspect fittings for damaged threads.

d. Installation. (1) Position check valves (1, figure 11-14) between tube assemblies.

(2) Remove caps and connect tube assemblies to check valves. Close engine cowling doors.

e. Adjustment. (1) Attach a rubber hose over forward end of discharge tube assembly so that expelled anti-icing fluid will be directed through a flowmeter and into a suitable container.

(2) Connect an external power source, adjust to 28.5 volts at aircraft bus and set control rheostat for maximum flow.

(3) Check anti-icing installation for leakage. Correct if any is found.

(4) With voltage at 28.5 volts, adjust check valve assemblies to obtain a maximum flow of 5 to 7 quarts per propeller per hour. To retard flow of fluid, screw valve in.

NOTE

If no suitable flowmeter is available, flow may be checked by determining time required to fill a vessel of known volume, or by measuring fluid discharged in a given time.

(5) After maximum flow has been obtained, check flow with control rheostat first set at NORM position. Adjust knob until a flow of 3-1/2 quarts per propeller per hour has been obtained, loosen knob and reset on shaft so index points to NORM setting.

(6) If system operates satisfactorily, remove testing equipment and replace any items removed from aircraft.

11-72. SOLENOID VALVE. The windshield anti-icing solenoid valve (4, figure 11-14) is located in the left-hand wing between the nacelle and fuselage. When the windshield anti-icing switch is pushed to the ON position, the solenoid valve opens and allows anti-icing to flow to the windshield spray nozzles.

a. Removal. (1) Open leading edge access door from beneath the left inboard wing.

(2) Disconnect electrical connection from solenoid valve (4, figure 11-14).

(3) Disconnect tube assemblies from solenoid valve. Cap all open fittings.

(4) Remove solenoid valve from wing structure.

b. Cleaning. (1) Clean solenoid valve with dry cleaning solvent (item 6, table 1-8).

(2) Dry solenoid valve with compressed air.

c. Inspection. (1) Inspect solenoid valve for cracks and corrosion.

(2) Inspect for damaged threads.

d. Installation. (1) Secure solenoid valve (4, figure 11-14) to the wing structure.

(2) Remove caps and connect tube assemblies to valve.

(3) Connect electrical plug and the ground wire.

(4) Close leading edge access door.

11-73. PUMP. The pump (2, figure 11-14) is located in the left-hand wing near the supply tank. It pumps fluid from supply tank to the propellers and, on the U-8F, to the windshield spray tubes.

a. Removal. (1) Open the leading edge access door from beneath left-hand wing.

(2) Drain supply tank (6, figure 11-14).

(3) Disconnect electrical connector plug from pump motor.

(4) Disconnect tube assemblies from the inboard end of pump (6). Cap all open fittings.

(5) Remove four bolts that secure pump mounting plate to rib channels.

(6) Remove pump and plate from aircraft.

b. Cleaning. (1) Clean pump with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Dry pump with compressed air.

c. Inspection. (1) Inspect pump for cracks and corrosion.

(2) Inspect for damaged threads.

d. Installation. (1) Attach pump (2, figure 11-14) to mounting plate and secure the screw heads with lock wire.

(2) Position pump assembly in the center section wing and install four attaching bolts through the mounting plate and rib channels.

(3) Connect electrical connector plug to the outboard end of pump motor.

(4) Remove caps and connect tube assemblies to inboard end of the pump.

(5) Refill supply tank (5).

(6) Close leading edge access door.

11-74. CIRCUIT BREAKER. The 5-ampere circuit breaker is located on the left-hand subpanel in the U-8D, U-8G, and RU-8D aircraft, and on the right-hand subpanel in the U-8F aircraft. Refer to paragraph 12-21 for description and maintenance instructions.

11-75. ANTI-ICING TUBE ASSEMBLIES. The anti-icing tube assemblies (figure 11-14) are routed from the supply tank (6) through the filter (5) to the pump (2), from the pump through a check valve (1), in each engine nacelle, and terminating at the propeller slinger rings. On the U-8F aircraft, a tube assembly is connected to a tee fitting in the right engine anti-icing line and is routed through a solenoid valve (4) to the windshield spray tubes (3), to allow for windshiled anti-icing.

a. Removal. (1) Disconnect tube assemblies from pump (2, figure 11-14), filter (5), supply tank (6), and check valves (1). On U-8F air-

craft, also disconnect tube assemblies from solenoid valve (4) and windshield spray tubes (3). Disconnect all interconnecting fittings. Cap all fittings.

(2) Remove all clamps securing tube assemblies. Remove tube assemblies.

b. Cleaning. (1) Clean tube assemblies with dry cleaning solvent (item 6, table 1-8).

(2) Blow out loosened dirt and residue. Dry tube assemblies with compressed air.

c. Inspection. (1) Inspect tube assemblies for cracks and corrosion.

(2) Inspect fittings for damaged threads.

d. Installation. (1) Route tube assemblies as shown in figure 11-14.

(2) Remove caps and connect tube assemblies to pump (2), filter (5), supply tank (6), check valves (1), solenoid valve (4), and windshield spray tubes (3). Connect all interconnecting fittings.

(3) Install all clamps and secure tube assemblies.

11-76. FLUID QUANTITY TRANSMITTER. The fluid quantity transmitter is attached to the supply tank. Refer to paragraph 10-56 for description and maintenance instructions.

11-77. FLUID QUANTITY GAGE. The fluid quantity gage is located on the right-hand side of the instrument panel in the U-8D, U-8G, and RU-8D, and on the left-hand subpanel in the U-8F. Refer to paragraph 10-56 for description and maintenance instructions.

11-78. ANTI-ICING RHEOSTAT SWITCH. The anti-icing rheostat switch is located on the left-hand subpanel. Refer to paragraph 12-131 for description and maintenance instructions.

11-79. WINDSHIELD ANTI-ICING SWITCH. The windshield anti-icing switch (U-8F) is located on the left-hand side of the instrument panel. Refer to paragraph 12-19 for description and maintenance instructions.

11-80. ANTI-ICING RINGS. The anti-icing rings are mounted on the aft side of the propeller spinner bulkheads. Anti-icing fluid is dumped into the rings. Centrifugal force then pulls the fluid through aluminum tubes, on the outer circumference of the ring, and deposits the fluid on the anti-icing shoes.

11-81. ANTI-ICING FEED SHOES. The synthetic rubber anti-icing feed shoes are mounted from the blade shank outward along the leading edge of each propeller blade. Their operational function is to guide the flow of anti-icing fluid over the propeller blade in such a manner as to prevent ice from forming on the propeller blades while the aircraft is in operation.

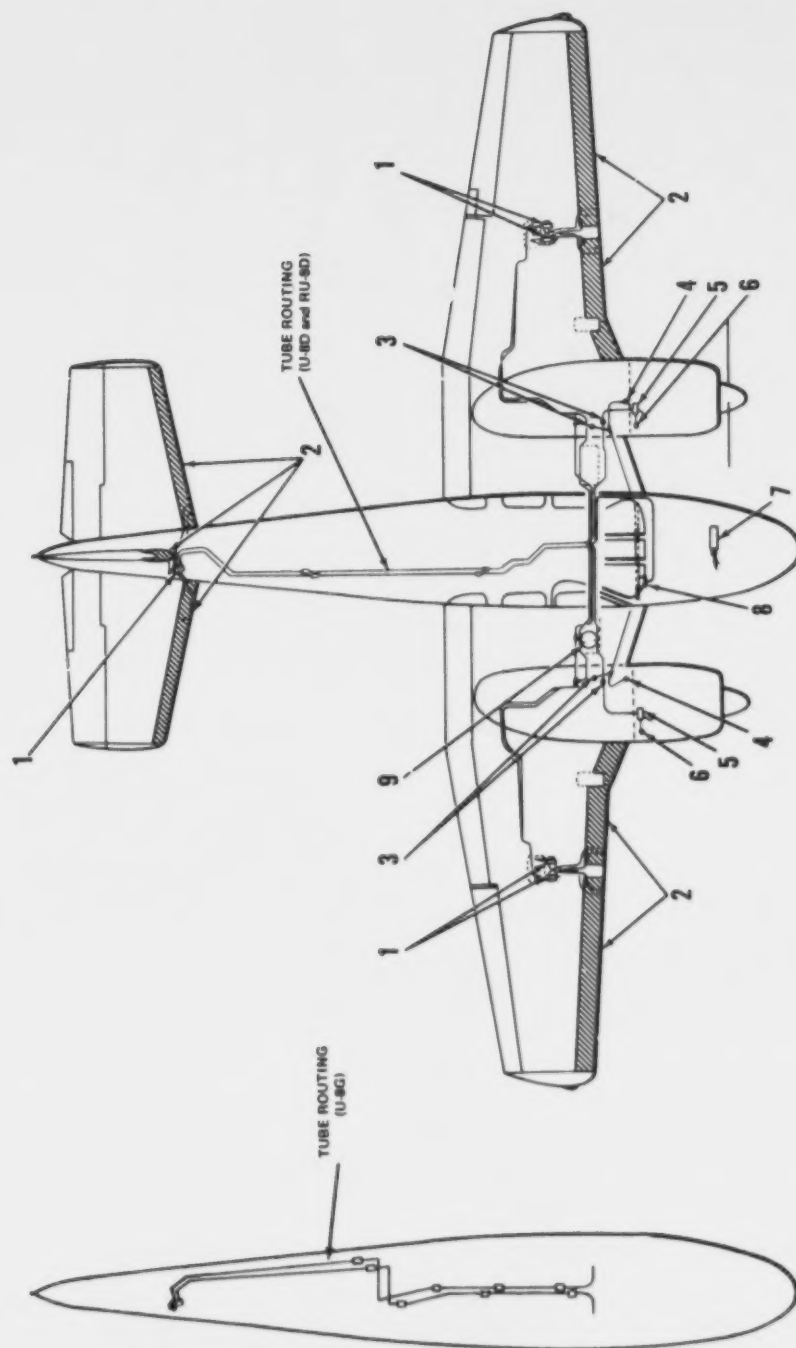
11-82. HIGH PRESSURE AND MEDIUM WEIGHT DEICER SYSTEMS DESCRIPTION.

11-83. The high pressure system (figures 11-15 and 11-16) is installed in the U-8D, U-8G and RU-8D aircraft. The medium weight deicer system (figures 11-17 and 11-18) is installed in the U-8F aircraft. The deicer systems are identical, except as noted. The systems remove ice accumulations from the leading edges of the wings, and the horizontal and vertical stabilizers. Pressure and vacuum are alternately connected to the deicing boots to inflate and deflate the boots, thus causing the ice formations to break up. The systems consist primarily of deicing boots, distributor valves safety relief valves, check valves, oil separator assembly or regulator, vacuum pumps, oil separators, suction relief valves, and a timer assembly or transistorized timer.

NOTE

The regulator and transistorized timer are used in U-8F aircraft.

Each deicing boot has two sets of internal air passages. Both pressure and vacuum are applied to each air passage through one port. The air supplied by the outlet or pressure side of the engine driven vacuum pumps inflates the deicing boots. Air under vacuum from the inlet side of the pump assists the deflation. Operational pressure from the vacuum pump outlet passes through the system safety relief valve (set at 17 psi maximum), the oil separator, and the oil separator assembly or regulator. The pressurized air is then routed to the system's distributor valves, (five in U-8D, U-8G, and RU-8D, and three in U-8F), which route air flow to and from the boots. The distributor valves are controlled by the timer. When the system is inoperative, the air from the vacuum pump is vented overboard through the oil separator assembly or regulator (unloading valve). This allows the vacuum pump to operate at no-pressure load. The distributor valves allow vacuum to be applied to the boots, for

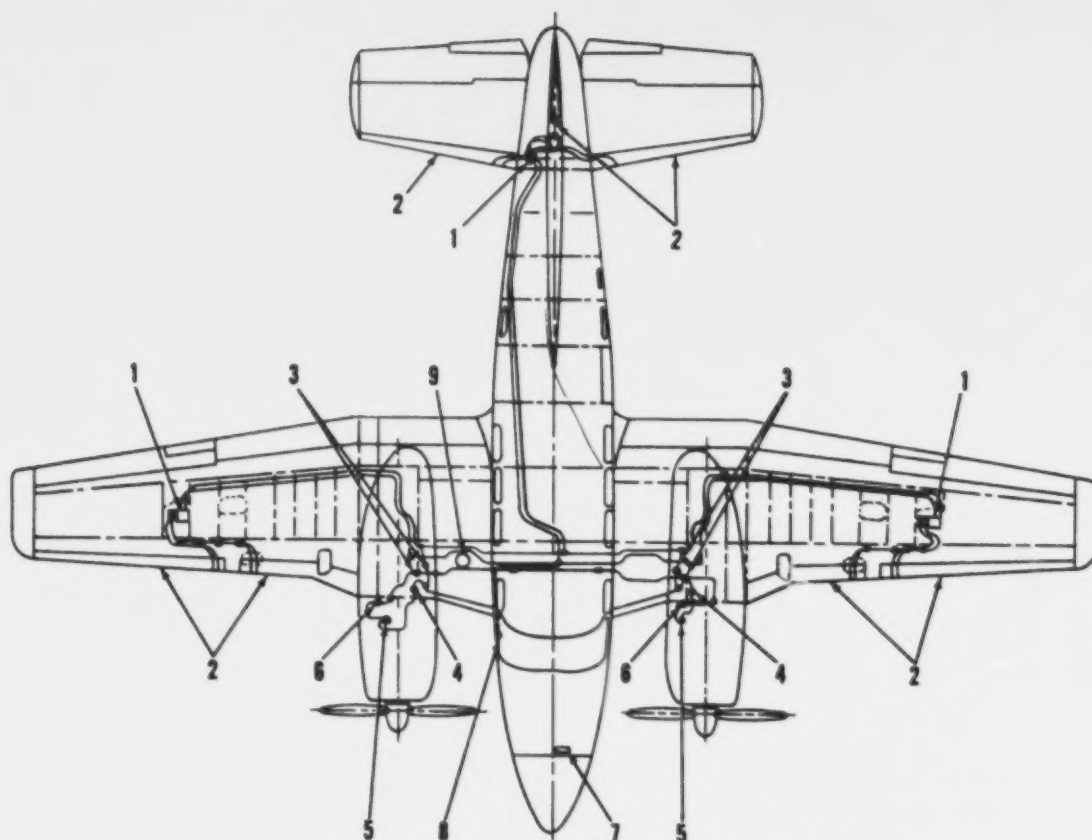


1. Distributor valves
2. Deicing boots
3. Check valves

4. Suction relief valve
5. Oil separator
6. Safety relief valve

7. Timer assembly
8. Pressure gage
9. Oil separator assembly

Figure 11-15. High pressure deicing system (U-8D, U-8G, and RU-8D)



- | | | |
|----------------------|-------------------------|-------------------------|
| 1. Distributor valve | 4. Suction relief valve | 7. Transistorized timer |
| 2. Deicing boots | 5. Oil separator | 8. Pressure gage |
| 3. Check valves | 6. Safety relief valve | 9. Regulator |

Figure 11-17. Medium weight deicing system (U-8F)

lating valve located on the inlet side of the vacuum pumps. The high pressure system (U-8D, U-8G, and RU-8D) is operated by a two position, ON-OFF toggle switch, located on the right subpanel. When the switch is placed to ON, the timer will be energized; thus starting the deicing cycle which will alternately inflate and deflate the boot passages fully, once every 60 seconds, until the control switch is placed to the OFF position. Refer to step c for cycling sequence. The medium weight system (U-8F) is operated by a three position, SINGLE, OFF, AUTO toggle switch, located on the left subpanel. When the switch is placed in the AUTO

position, the system will start operating and complete one cycle every 60 seconds until the switch is turned to the OFF position. When the switch is placed in the SINGLE position, the system will make one complete cycle. Refer to step d for cycling sequence.

a. Troubleshooting. Troubleshooting (U-8D, U-8G, and RU-8D) consists of locating and correcting failure, leakage, or unsatisfactory operation of the high pressure deicing system. The following procedures list the most common troubles, probable causes, and possible remedies.

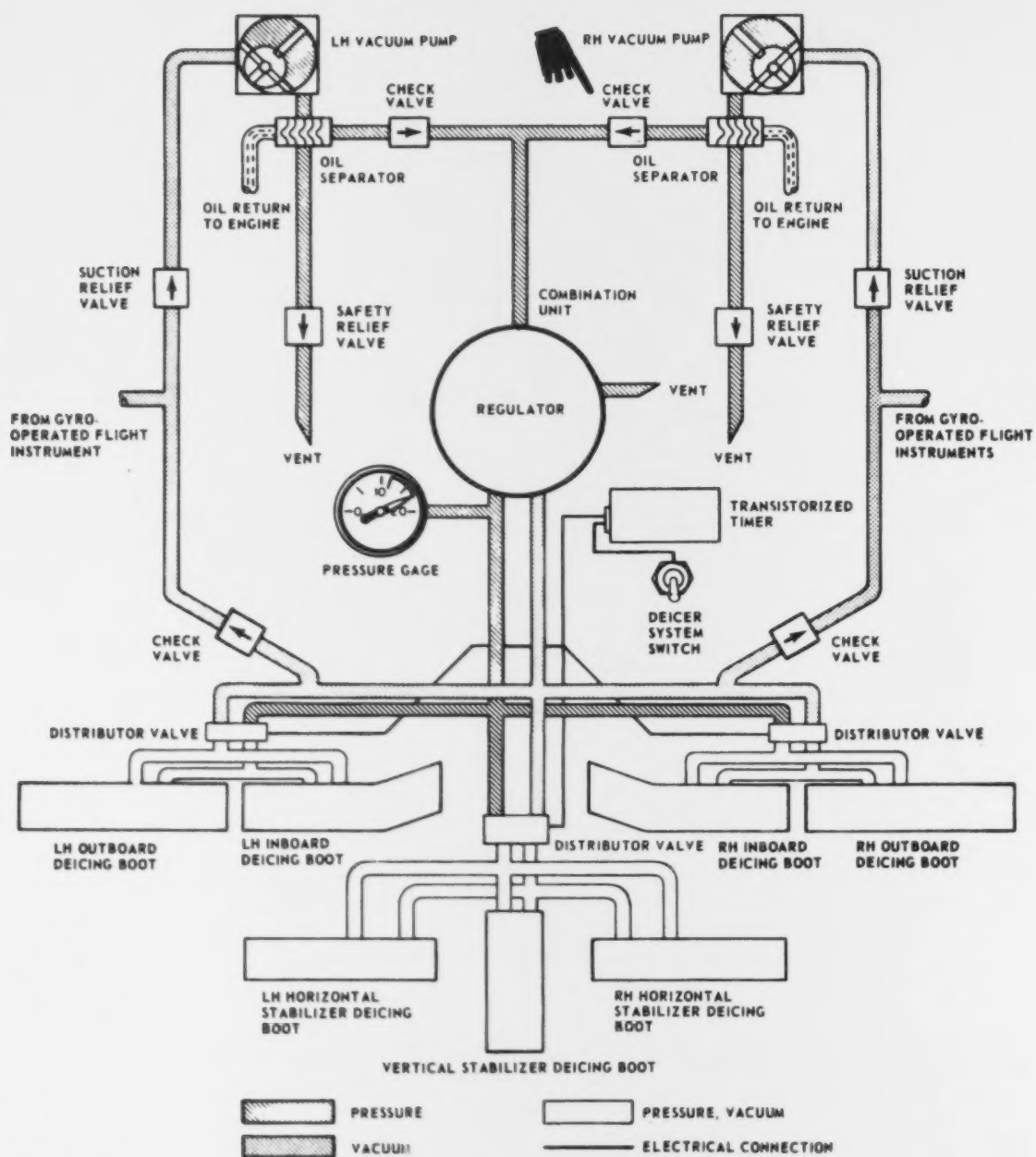


Figure 11-18. Medium weight deicing system schematic (U-8F)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
System inoperative	Circuit breaker tripped	Reset circuit breaker. If circuit breaker trips repeatedly, refer to circuit breaker trips repeatedly.
	Defective toggle switch	Replace toggle switch. (Refer to paragraph 12-17.)
	Open in lead D-102	Check continuity of lead D-102. Replace or repair defective lead.
	Defective timer	Replace timer. (Refer to paragraph 12-133.)
	Defective oil separator assembly	Replace oil separator assembly. (Refer to paragraph 11-88.)
	Open in lead D-103 or D-126	Check continuity of leads from timer to oil separator assembly. Replace or repair defective leads.
Circuit breaker trips repeatedly	Defective timer	Replace timer. (Refer to paragraph 12-133.)
	Shorted lead D-102 from timer to circuit breaker	Isolate lead D-102 by disconnecting from timer and circuit breaker and test for short to ground. Replace or repair defective lead.
Toggle switch will not turn system OFF	Defective switch	Replace switch. (Refer to paragraph 12-17.)
	Shorted lead D-101	Isolate lead D-101 by disconnecting from timer and switch. Test for short to ground. Replace or repair defective lead.
Timer trips rapidly through all positions when control switch is replaced to ON	Defective toggle switch	Replace switch. (Refer to paragraph 12-17.)
	Shorted lead D-100	Isolate lead D-100 by disconnecting from timer and switch. Test wire for short to ground. Replace or repair defective lead.
A or B port of one wing boot does not inflate	Defective distributor valve	Replace distributor valve. (Refer to paragraph 11-85.)
	Open circuit from deicing terminal strip to distributor valve	Isolate circuit at deicing terminal strip (terminal 4 inboard of B port, 5 inboard A, 6 outboard B, 7 outboard A).

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
A or B ports of both outboard or inboard wing boots do not cycle	Open in lead D-109, D-108, D-107, or D-106	Check continuity of lead from timer to deicing terminal strip. Replace or repair faulty lead.
	Fuse F1, F2, F3, or F4 in timer blown	Refer to fuse in timer blown.
A or B ports of empennage boots do not cycle	Defective distributor valve	Replace distributor valve. (Refer to paragraph 11-85.)
	Open in lead D-105, D-127, D-104, or D-128	Check continuity of leads from timer to distributor valve. Replace or repair faulty leads.
	Fuse F5 or F6 in timer blown	Refer to fuse in timer blown.
	Defective timer	Replace timer. (Refer to paragraph 12-133.)
Fuse F1, F2, F3, F4, F5, or F6 in timer blown	Short to ground in lead between timer and distributor valve	Isolate the circuit at the timer, deicing terminal strip, wing terminal strip, (Fuse F1, F2, F3, F4 only), and at the distributor valve. Test circuit for short to ground. Replace or repair faulty lead. Replace fuses.
	Defective distributor valve	Replace distributor valve. (Refer to paragraph 11-85.)
Boots inflate slowly	Deicing pressure too low	Adjust oil separator assembly. (Refer to paragraph 11-88.)
	Vacuum pump inoperative	Check vacuum pumps for operation. Replace defective pump. (Refer to paragraph 11-89.)
	Pressure leak in system	Check system for leaks from vacuum pumps to oil separator assembly.
Oil separator assembly inoperative	Open lead from timer to oil separator assembly	Check continuity of lead. Repair or replace lead.
	Defective oil separator assembly	Replace oil separator assembly. (Refer to paragraph 11-88.)
	Defective timer	Replace timer. (Refer to paragraph 12-133.)

b. Troubleshooting. Troubleshooting (U-8F) consists of locating and correcting failure, leakage, or unsatisfactory operation of the

medium weight deicing system. The following procedures list the most common troubles, probable causes, and possible remedies.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
System inoperative	Circuit breaker tripped	Reset circuit breaker. If breaker trips repeatedly, refer to circuit breaker trips repeatedly.
	Defective timer	Replace timer. (Refer to paragraph 12-133.)
	Regulator inoperative	Replace regulator. (Refer to paragraph 11-88.)
	Open in timer ground lead	Check continuity of lead H58A20N from pin L of timer plug to ground. Replace or repair defective ground.
	Defective toggle switch	Replace toggle switch. (Refer to paragraph 12-17.)
Circuit breaker trips repeatedly	Defective timer	Replace timer. (Refer to paragraph 12-133.)
	Short to ground between circuit	Isolate leads H59A18 and H59B18 at the circuit breaker. Disconnect the timer plug and check for short to ground at pins M and L. Repair or replace defective lead.
	Defective wing or tail distributor valve	Isolate distributor valves individually and operate system until defective valve is located. Replace defective distributor valve. (Refer to paragraph 11-85.)
	Defective regulator	Isolate regulator by disconnecting electrical connector. Operate system. If circuit breaker does not trip, replace regulator. (Refer to paragraph 11-88. If breaker trips, proceed to next step.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
	Shorted lead from timer to regulator	Isolate leads by disconnecting timer and regulator electrical connectors. Check lead H49A20 for short to ground at pin N of timer plug. Replace or repair defective lead. If no short is found, proceed to next step.
	Shorted lead from timer to tail distributor valve	Isolate leads by disconnecting timer and distributor valve electrical connectors. Check leads H51A20 and H52A20 for short to ground at pins D and C of the timer plug. Repair or replace defective leads. If no short is found, proceed to next step.
	Shorted lead from timer to one wing distributor valve	Isolate leads by disconnecting the timer and wing distributor valve electrical connectors. Disconnect leads from terminals 9 and 10 of the left and right wing terminal strips. Check leads H54A20 and H55A20 for shorts at pins A and B of timer plug. Check leads H54B20 and H55B20 at pins B and A of right wing distribution valve plug. Check leads H54C20 and H55C20 at either wing terminal strip. Check leads H54D20 and H55D20 at pins B and A of the left wing distributor valve plug. Repair or replace any defective leads.
System operates on AUTO only	Defective toggle switch	Replace toggle switch. (Refer to paragraph 12-17.)
	Defective timer	Replace timer. (Refer to paragraph 12-133.)
	Open power circuit	Check continuity of leads H59B18, H60B20, or H48A20. Replace or repair defective leads.
System operates on SINGLE only	Defective toggle switch	Replace toggle switch. (Refer to paragraph 12-17.)
	Defective timer	Replace timer. (Refer to paragraph 12-133.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
A or B ports of left or right wing boots will not inflate	Open power circuit	Check continuity of leads H59A18 and H60A18. Replace or repair defective leads.
	Defective distributor valve	Replace distributor valve. (Refer to paragraph 11-85.)
	Open lead from right wing terminal strip to inoperative boot	Check continuity of leads H54B20 (right wing B ports), H55B20 (right wing A ports), H54D20 (left wing B ports), and H55D20 (left wing A ports). Replace or repair defective lead.
A or B ports of left and right wing boots will not inflate	Defective timer	Replace timer. (Refer to paragraph 12-133.)
	Open lead from timer to right wing terminal strip	Check continuity of leads H54A20 (B ports) and H55A20 (A ports). Replace or repair defective leads.
A or B ports of stabilizer boots will not inflate	Defective distributor valve	Replace distributor valve. (Refer to paragraph 11-85.)
	Defective timer	Replace timer. (Refer to paragraph 12-133.)
	Open lead from timer	Check continuity of leads H51A20 (B ports) and H52A20 (A ports). Replace or repair defective leads.
Regulator inoperative	Open lead from timer to regulator	Check continuity of lead H49A20. Replace or repair defective lead.
	Defective regulator	Replace regulator. (Refer to paragraph 11-88.)
	Defective timer	Replace timer. (Refer to paragraph 12-133.)
Boots inflate slowly	One vacuum pump inoperative	Check vacuum pumps for operation. Replace defective pump. (Refer to paragraph 11-89.)
	Pressure leak in system	Check system for leaks from vacuum pumps to regulator. Repair or replace faulty components.

c. Operational Check. To check the high pressure deicer system (U-8D, U-8G and RU-8D) proceed as follows:

(1) Start engines in accordance with applicable operator's manual (-10), and allow engines to warm up to normal operating temperatures.

(2) Advance both engines to approximately 2600 rpm and observe the suction gage for an approximate reading of 4.2 inches Hg with the vacuum pump selector knob in the INSTRUMENT NORMAL position.

(3) Place the deicer toggle switch to the ON position and allow a 5-second delay for tube warmup in the timer assembly. The deicing cycle will then begin as follows:

(a) The A ports on the inboard deicer boots of each wing will operate first.

(b) The B ports on the inboard deicer boots of each wing will operate second.

(c) The A ports on the outboard deicer boots will be the third to operate.

(d) The B ports on the outboard deicer boots will operate fourth.

(e) The A ports on the horizontal and vertical stabilizer deicer boots will operate fifth.

(f) The B ports on the horizontal and vertical stabilizer deicer boots will operate sixth.

(g) The final operation is a 23-second pause, during which the distributor valves, controlled by the timer assembly, apply vacuum to the deicer boots while the pressure side of the vacuum pump is vented overboard. When the switch is turned to the OFF position, the timer trips through the remaining contacts rapidly to the homing position of the timer. The timer when turned on will start at the No. 1 position again. All ports will remain inflated for a period of 5 seconds with the exceptions of the A ports on the outboard wings and the horizontal and vertical stabilizers, these ports will remain inflated for a period of 6 seconds. If the deicing system operational check does not correspond with the steps listed above, the timer assembly must be replaced as described in paragraphs 12-133.

CAUTION

To prevent overheating of the vacuum pumps, do not operate the deicing system on the ground over one cycle.

(4) Shut down engines and turn all electrical switches OFF.

d. Operational Check. To check the medium weight deicer system (U-8F), proceed as follows:

(1) Start engines in accordance with applicable

operator's manual (-10), and allow engines to warm up to normal operating temperatures.

(2) Advance both engines to approximately 2600 rpm and observe the suction gage for an approximate reading of 4.2 inches Hg.

(3) Place the deicer toggle switch to the SINGLE position and allow a 3-second delay for system warmup. The deicing cycle will begin as follows:

(a) The A ports of the wing deicer boots will inflate for approximately 6 seconds.

(b) The B ports of the wing deicer boots will then inflate for approximately 4 seconds.

(c) After a 21.5-second pause, the A ports of the stabilizer deicer boots will inflate for 4 seconds.

(d) The B ports of the stabilizer deicer boot will inflate for 3 seconds.

(e) The final operation is an 18.5-second pause. During the pause after the wing deicer boot and stabilizer deicer boot operating cycle, the regulator dumps all air pressure overboard. This allows the pump to operate under a no load condition for better pump cooling. If the deicing system operational check does not correspond with the above steps, the transistorized timer must be replaced as described in paragraphs 12-133.

(f) Shut down engines and turn all electrical switches OFF.

11-84. DEICING BOOTS. The deicing boots (2, figure 11-15 and 2, figure 11-17) are mounted on the wing and stabilizer leading edges. The boots are made of soft rubber that is wind abrasion resistant, and are coated with a special prenite-graphite cement to provide good conductivity to eliminate static charges. Each boot has internal passages (A and B ports) that are alternately inflated and deflated, causing a flexing action that breaks up the ice formations.

a. Cleaning. The deicing boots should be checked for engine oil after servicing the aircraft and after each flight. Any oil found on the boots should be removed with a solution of water and soap (item 91, table 1-8). Rinse off thoroughly with clean water. Care should be exercised to avoid scrubbing the surface of the boots as this will tend to remove the special graphite surfacing.

CAUTION

Since the boots are made from soft flexible stock, care must be exercised against dragging gasoline hoses over them or resting ladders or platforms against them.

b. Inspection. (1) Inspect deicing boots (2, figures 11-15 and 11-17) for large abrasions, cuts, and weather cracking.

(2) Inspect edges of boots for proper adhesion to airframe structure.

11-85. DISTRIBUTOR VALVES. The distributor valves apply pressure and vacuum, alternately, to the deicing boots. The distributor valves are electrically controlled by the deicing timer assembly, through a solenoid and servo valve mechanism. A discharge port on the valve allows air pressure to be discharged from the boot after the inflation cycle is completed.

a. Removal. (1) Remove deicing distributor valves access cover (19, figure 1-7 and 1-8) from beneath the wings, and fuselage access door (10, figure 1-9, 11, figure 1-10, and 7, figure 1-11) from the aft fuselage.

(2) Disconnect hose connections from distributor valves. Cap all open connections

(3) Disconnect electrical connections.

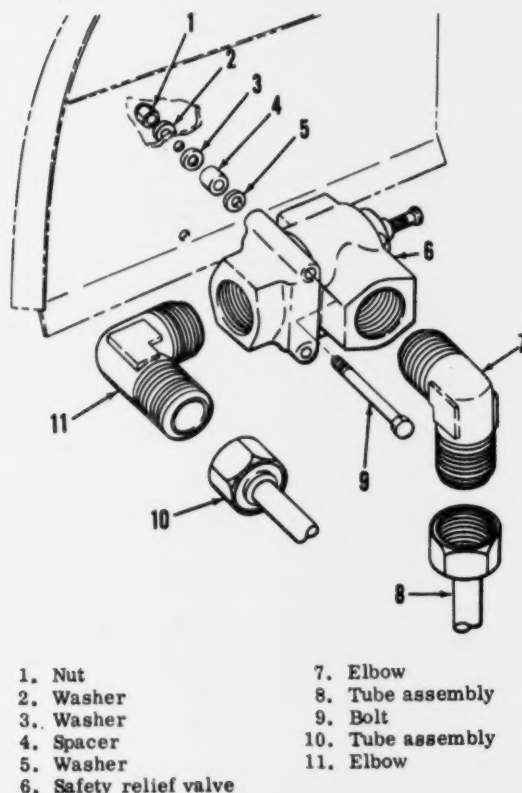


Figure 11-19. Safety relief valve installation

(4) Remove distributor valves mounting bolts and washers.

(5) Remove distributor valves (1, figures 11-15 and 11-17).

b. Cleaning. (1) Clean distributor valves in dry cleaning solvent (item 6, table 1-8).

(2) Dry valve with filtered, compressed air not exceeding 15 psi.

c. Inspection. (1) Inspect distributor valves for cracks and corrosion.

(2) Check port connections for damaged threads.

(3) Inspect electrical connections.

d. Installation. (1) Position distributor valves. Secure with mounting bolts and washers.

(2) Remove caps and connect hoses to valves. Secure with hose clamps.

(3) Connect electrical connection.

(4) Install access covers.

11-86. SAFETY RELIEF VALVES. The safety relief valves (figure 11-19) are located on the upper forward side of each engine firewall. They have been preset by the manufacturer to automatically release the deicing system operating pressure whenever 17 psi is exceeded. Do not tamper with or attempt to reset the safety relief valve in any way while it is mounted on the aircraft.

NOTE

Any system operating pressure adjustments must be made only on the oil separator assembly or regulator or on the suction relief valve.

a. Removal. (1) Open engine cowling doors.

NOTE

Cap all open fittings.

(2) Disconnect tube assemblies (8 and 10, figure 11-19) from safety relief valve (6).

(3) Remove nuts (1) and washers (2) on aft side of firewall.

(4) Remove bolts (9), washers (3 and 5), and spacers (4).

(5) Remove safety relief valve (6) from aircraft.

(6) Remove elbows (7 and 11) from safety relief valve (6).

b. Cleaning. (1) Clean safety relief valve (6) with dry cleaning solvent (item 6, table 1-8).

(2) Dry safety relief valve with compressed air.

c. Inspection. (1) Inspect valve for cracks and corrosion.

(2) Inspect valve ports for damaged threads.

d. Installation. (1) Remove caps and connect elbows (7 and 11, figure 11-19) to safety relief valve (6).

(2) Position safety relief valve against forward side of firewall and secure with bolts (9), washers (2, 3, and 5), spacers (4), and nuts (1).

(3) Remove caps and connect tube assemblies (8 and 10) to elbows (7 and 11).

(4) Close engine cowling doors.

11-87. CHECK VALVES. The deicer system has two check valves (3, figures 11-15 and 11-17) in the vacuum line and two check valves in the pressure lines. All four valves are located in the wings above the nacelle fairings. If one pump fails, its check valves prevent the operating pump from drawing or expelling air through the inoperative pump.

a. Removal. (1) Remove the right-hand and the left-hand nacelle fairings from beneath the inboard side of the nacelles.

(2) Disconnect tube assemblies from check valves. Cap all open fittings.

(3) Remove check valves from wing.

b. Cleaning. (1) Clean check valves with dry cleaning solvent (item 6, table 1-8).

(2) Dry valves with compressed air.

c. Inspection. (1) Inspect check valves for cracks and corrosion.

(2) Inspect check valves for damaged threads.

d. Installation. (1) Position check valves (3, figures 11-15 and 11-17) between tube assemblies with the directional arrow "up" and pointed in direction of flow. (See figures 11-16 and 11-18.)

(2) Remove caps and connect tube assemblies to check valves.

(3) Install nacelle fairings.

11-88. OIL SEPARATOR ASSEMBLY OR REGULATOR. The oil separator assembly (9, figure 11-15) used in U-8D, U-8G, and RU-8D aircraft, or regulator (9, figure 11-17) used in U-8F aircraft is mounted in the right wing between fuselage and nacelle. It removes oil and oil vapor from the air before air is routed to the deicing boots. It also discharges air from vacuum pump overboard when the system is not in operation, and maintains the air at 12 to 17 psi when the system is in operation.

a. Removal. (1) Open deicing access door (17, figures 1-7 and 1-8) and remove center cover

(31) from right-hand wing, to permit access to oil separator assembly or regulator.

(2) Disconnect tube assemblies from oil separator assembly or regulator. Cap all open fittings.

(3) Disconnect electrical connections.

(4) Remove mounting bolts and lower oil separator assembly or regulator from wing.

(5) Remove fittings from oil separator assembly or regulator. Cap all open fittings.

b. Cleaning. (1) Clean oil separator assembly or regulator with dry cleaning solvent (item 6, table 1-8).

(2) Dry with compressed air.

c. Inspection. (1) Inspect fittings for damaged threads.

(2) Inspect for cracks and corrosion.

(3) Inspect cellulose cotton filter for clogging.

d. Repair or replacement. Check cellulose cotton filter in oil separator assembly or regulator every 25 hours of deicing operation. If filter is clogged, replace filter.

e. Installation. (1) Remove caps and connect all fittings on oil separator assembly or regulator.

(2) Secure oil separator assembly or regulator to mounting brackets with bolts.

(3) Remove caps and connect tube assemblies and electrical leads to oil separator assembly or regulator.

(4) Close deicing access door (17, figure 1-7 and 1-8) and install center cover (31) on right-hand wing.

f. Adjustment. If any pressure adjustment is required for the deicing system, (U-8D, U-8G, and RU-8D), it should only be made on the oil separator assembly adjusting screw. Proceed as follows:

(1) Open deicing access door (17, figure 1-7 and 1-8) located in the top of right stub wing center section.

(2) Cut and remove lock wire from the cover screws. Remove screws and cover from upper portion of assembly.

(3) Turn adjusting screw to adjust the system operating pressure between 12 and 17 psi on the deicing pressure gage, located on instrument panel.

(4) Start both engines in accordance with TM 55-1510-201-10, and run up to cruise rpm. If a normal suction gage reading of approximately 4.2 inches Hg is attained, place the deicing switch to ON. Check the instrument panel deicing pressure gage for correct reading. Repeat steps (3) and (4) until the correct reading is obtained. Stop engines.

(5) Reinstall the cover and secure with screws and lock wire.

(6) Close deicing access door.

11-89. VACUUM PUMP. A vacuum pump (5, figure 11-20) is mounted on the right-hand side of each engine accessory section to provide vacuum and pressure for the deicer system and the attitude indicator (standby). If either engine fails, the pump on the other engine is capable of operating the system.

a. Removal. (1) Open engine cowling doors.

NOTE

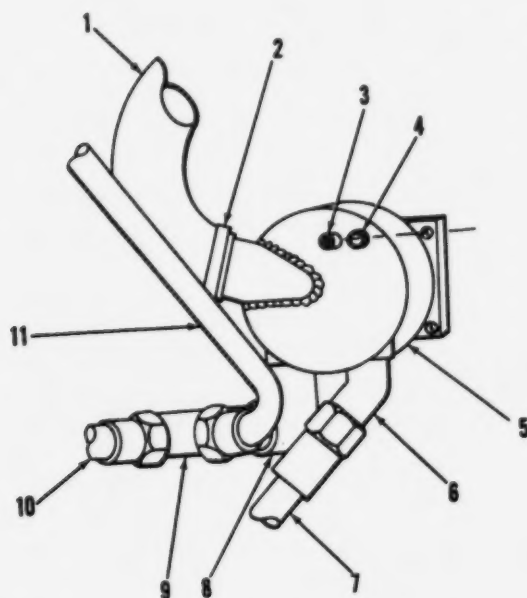
Cap all open fittings.

(2) Loosen hose clamp (2, figure 11-20) securing air duct hose (1) to vacuum pump (5). Disconnect air duct hose from fitting on vacuum pump.

(3) Disconnect hose assemblies (10 and 11) from tee (9).

(4) Disconnect hose assembly (7) from elbow (6).

(5) Remove elbows (6 and 8) from vacuum pump. Remove tee (9) from elbow (8).



- | | |
|-----------------|-------------------|
| 1. Airduct hose | 7. Hose assembly |
| 2. Hose clamp | 8. Elbow |
| 3. Nut | 9. Tee |
| 4. Washer | 10. Hose assembly |
| 5. Vacuum pump | 11. Hose assembly |
| 6. Elbow | |

Figure 11-20. Vacuum pump installation

(6) Remove nuts (3) and washers (4) and remove vacuum pump (5) from engine.

(7) Install plugs in ports of pump.

b. Cleaning. (1) Clean vacuum pump with clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Dry vacuum pump with compressed air.

c. Inspection. (1) Inspect pump for cracks and corrosion.

(2) Inspect ports for damaged threads.

d. Installation. (1) Remove plugs from ports in vacuum pump.

(2) Remove caps and connect elbows (6 and 8, figure 11-20) to vacuum pump (5). Connect tee (9) to elbow (8).

(3) Apply a light coat of grease (item 50, table 1-8) to pump drive.

(4) Carefully engage vacuum pump drive with engine drive. Secure pump to engine with washers (4) and nuts (3). Torque nuts to 75 inch-pounds.

(5) Remove caps and connect hose assemblies (10 and 11) to tee (9). Connect hose assembly (7) to elbow (6).

(6) Position air duct hose (1) over fitting on vacuum pump (5) and tighten hose clamp (2).

(7) Close engine cowling doors.

11-90. OIL SEPARATOR. The oil separators, (2, figure 11-21) located in the vacuum pump pressure lines, remove most of the pump lubricating oil from the air and return the oil to the engine oil sump. As air passes through the separator, oil in the air collects on baffles. Then the oil drains to the bottom of the oil separator and is returned to the engine.

a. Removal. (1) Open engine cowling doors.

NOTE

Cap all open fittings.

(2) Disconnect tube assemblies (1, 3, and 4) from fittings on oil separator (2).

(3) Remove cotter pins (12), nuts (11), bolts (6), washers (7), and metal strips (10) securing oil separator to bracket (5).

(4) Remove oil separator (2), strips (8), and bushings (9).

(5) Remove fittings from oil separator.

b. Cleaning. (1) Fill oil separator with dry cleaning solvent (item 6, table 1-8). Cap fittings.

(2) Allow oil separator to soak, sloshing solvent occasionally, then drain solvent from oil separator. Repeat, until solvent drains clean.

(3) Dry oil separator with compressed air, and replace caps.

c. Inspection. (1) Inspect oil separator for cracks and corrosion.

(2) Inspect fittings for damaged threads.

d. Installation. (1) Position strips (8, figure 11-21) on each side of mounting flange of oil separator and install bushings (9) through holes.

(2) Position oil separator (2) against bracket (5). Secure with bolts (6), washers (7), metal strip (10), nuts (11), and cotter pins (12).

(3) Remove caps and connect fittings to oil separator, and connect tube assemblies (1, 3, and 4) to fittings.

(4) Close engine cowling doors.

11-91. SUCTION RELIEF VALVES. The suction relief valves (U-8D, U-8G, and RU-8D), are incorporated in the vacuum system to provide a means to regulate vacuum. As the vacuum builds up with increasing engine rpm, the relief valves allow air to enter the vacuum pump inlet lines to prevent the vacuum of the system from exceeding the operating limits. On aircraft serial No. 56-3695 through 57-3100, and 57-6029 through 57-6031, the suction relief valves are located on the lower right portion of the forward side of the firewall. On aircraft serial No. 57-3101 and 57-6032 through 59-4992, the suction relief valves are located on the inboard side of the wheel wells just aft of the firewalls.

a. Removal. (1) Use the following procedure to remove suction relief valves mounted on the forward side of the firewall:

(a) Open engine cowling doors.

NOTE

Cap all open fittings.

(b) Working through wheel well, disconnect tube assembly and aft fitting from suction relief valve.

(c) Working through engine cowl, remove hose assembly from valve.

(d) Cut lock wire and remove mounting bolts and suction relief valve.

(e) Remove fitting from valve.

(2) Use the following procedure to remove suction relief valves mounted aft of the firewall:

(a) Working through wheel well disconnect tube assemblies from suction relief valves.

(b) Remove suction relief valve from tube assemblies. Remove fittings from valve, and cap all open fittings.

b. Cleaning. (1) Remove lockring securing screen in body of suction relief valve. Remove screen.

(2) Clean screen suction relief valve with dry cleaning solvent (item 6, table 1-8).

(3) Dry screen and valve with compressed air.

(4) Install screen in body of suction relief valve and secure with lockring.

NOTE

The screen should be cleaned at each periodic inspection. Since the suction relief valve bleeds outside air into the vacuum pump to control the system vacuum, it is essential to the proper operation of the vacuum driven instruments that the relief valve screens be kept clean. Under severe dusty conditions, it may be necessary to clean the screens more often. Should it appear that the relief valves need adjustment to lower the vacuum, clean the screens and recheck the vacuum setting before adjusting the relief valves.

c. Inspection. (1) Inspect suction relief valve for cracks and corrosion.

(2) Inspect ports and fittings for damaged threads.

(3) Inspect screen for dirt or damage.

(4) Inspect adjusting screw and locknut for damaged threads.

d. Installation. (1) Install suction relief valves removed in step a (1) as follows:

(a) Remove caps and connect fittings on suction relief valve.

(b) Position valve on support bracket and secure with bolts. Secure bolts with lock wire.

(c) Remove caps and connect hose assembly to valve.

(d) Working through wheel well, remove caps. Connect tube assembly to suction relief valve.

(e) Adjust suction relief valve in accordance with step e.

(f) Close engine cowling doors.

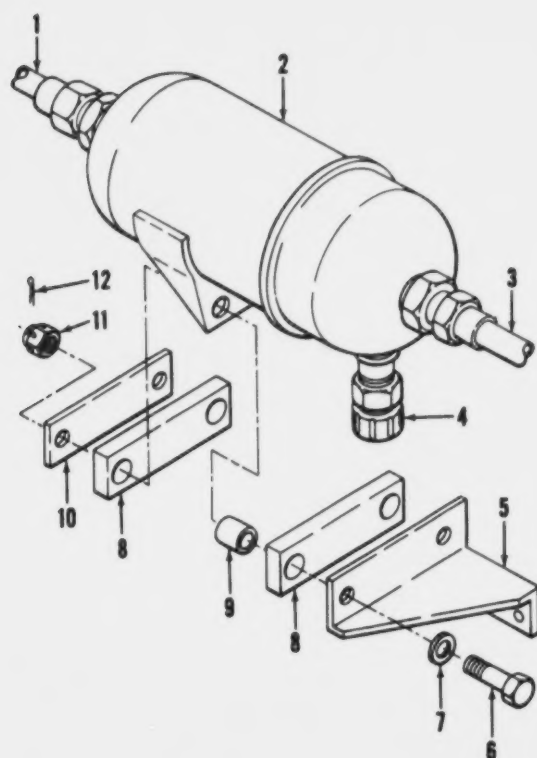
(2) Install suction relief valves removed in step a (2) as follows:

(a) Working through wheel well, remove caps and connect inlet and outlet tube assemblies to suction relief valve.

(b) Tighten hose clamps.

(c) Adjust suction relief valve in accordance with step e.

e. Adjustment. With the vacuum selector valve in NORMAL position, each vacuum pump, when operated individually, should indicate 4 inches Hg at 2000 rpm.



- | | | |
|------------------|------------|-----------------|
| 1. Tube assembly | 5. Bracket | 9. Bushing |
| 2. Oil separator | 6. Bolt | 10. Metal strip |
| 3. Tube assembly | 7. Washer | 11. Nut |
| 4. Tube assembly | 8. Strip | 12. Cotter pin |

Figure 11-21. Oil separator installation

- (1) Bend lockwasher tabs clear of locknut.
- (2) Loosen locknut and turn adjusting screw counterclockwise to increase and clockwise to decrease suction indication.
- (3) Tighten locknut and close engine cowl doors.
- (4) Start engine related to affected valve in accordance with TM 55-1510-201-10 and allow engine to reach operating temperature.
- (5) Advance engine to 2000 rpm and check suction gage for reading of 4 inches Hg. If incorrect, shut down engine and repeat steps (1) through (5).
- (6) Repeat steps (1) through (5) for opposite valve.
- (7) Start both engines in accordance with TM 55-1510-201-10.
- (8) Check suction gage indication at 2000 rpm. The indication should be slightly higher with

both engines running. If correct, shut down engines and secure locknuts with lockwasher tabs.

11-92. SUCTION RELIEF VALVES. The suction relief valves (U-8F) are located in the vacuum pump inlet lines, in the main wheel wells, just aft of the firewall. As the vacuum builds up with increasing engine rpm, the relief valve allows air to enter the vacuum pump inlet line to prevent the vacuum of the system from exceeding the operating limits.

a. Removal. (1) Working from wheel well, disconnect tube assemblies from suction relief valves.

(2) Cap open fittings and remove valve.

b. Cleaning. Clean valve in accordance with paragraph 11-91.

c. Inspection. Inspect valve in accordance with paragraph 11-91.

d. Installation. (1) Remove caps and secure tube assemblies to suction relief valve.

(2) Adjust valve in accordance with step e.

e. Adjustment. (1) Open engine cowlings.

(2) Cut lock wire on the adjusting screw locknut.

(3) Start the engine, for suction relief valve to be adjusted, and allow it to reach operating temperatures as described in TM 55-1510-201-10.

(4) Loosen adjusting screw locknut.

(5) Advance engine to 2400 rpm and turn the adjusting screw on suction relief valve counterclockwise to increase or clockwise to decrease, until the gage reads 4.2 inches Hg.

(6) Tighten adjusting screw locknut and secure with lock wire.

(7) Shut down the engine and repeat steps (1) through (6) for the opposite suction relief valve.

(8) Start both engines and check gage. If vacuum is not 4.5 inches Hg, readjust the relief valves as outlined in steps (1) through (6).

(9) Close engine cowlings.

11-93. TUBE AND HOSE ASSEMBLIES. The deicer system tube and hose assemblies (figures 11-15 and 11-17) are routed through the wings, nacelles, and fuselage between the various components of the system.

a. Removal. (1) Remove inspection plates, access covers, and nacelle fairings, as required, to gain access to tube and hose assemblies.

NOTE

Cap all open fittings, and plug open ports. During removal, rotate coupling nut of tubing or hose assembly with one wrench while holding fitting, to which it is secured with another wrench.

(2) Disconnect all hose assemblies from the deicing boots (2, figure 11-15 and 11-17) and distributor valves (1). Remove clamps. Remove hose assemblies.

(3) Disconnect tube and hose assemblies between the distributor valves (1) and oil separator assembly (9) or regulator (9). Remove clamps. Remove hose and tube assemblies.

(4) Disconnect tube assemblies between oil separator assembly (9) or regulator (9) and check valves (3). Remove clamps. Remove tube assemblies.

(5) Disconnect tube and hose assemblies between oil separators (5), check valves (3), and safety relief valves (6). Remove clamps. Remove tube and hose assemblies.

(6) Disconnect tube and hose assemblies between oil separators (5), vacuum pumps, suction relief valves (4), and check valves (3).

(7) Disconnect all deicing system tube and hose assemblies from interconnecting fittings not removed in above steps. Remove clamps. Remove tube and hose assemblies.

b. Cleaning. (1) Clean tube and hose assemblies, and fittings with dry cleaning solvent (item 6, table 1-8). Dry with compressed air.

(2) Clean clamps with dry cleaning solvent (item 6, table 1-8). Dry with compressed air.

c. Inspection. (1) Inspect tube and hose assemblies for cracks and corrosion.

(2) Inspect fittings for damaged threads.

(3) Inspect hose assemblies for chafing, cuts, and fraying.

(4) Inspect clamps for torn rubber and elongated holes.

d. Installation. (1) Route tube and hose as-

semblies between oil separators (5, figures 11-15 and 11-17) and vacuum pumps, suction relief valves (4) and check valves (3). Connect tube and hose assemblies to components. Install clamps.

NOTE

Remove all caps and plugs before installation. During installation, rotate coupling nut of tubing or hose assembly with one wrench while holding fitting, to which it is secured, with another wrench.

(2) Route tube and hose assemblies between oil separators (5), check valves (3), and safety relief valves (6). Connect tube and hose assemblies to components. Install clamps.

(3) Route tube assemblies between oil separator assembly (9) or regulator (9), and check valves (3). Connect tube assemblies to components. Install clamps.

(4) Route tube and hose assemblies between distributor valves (1) and oil separator assembly (9) or regulator (9). Connect tube and hose assemblies to components. Install clamps.

(5) Route hose assemblies between distributor valves (1) and deicing boots (2). Connect hose assemblies to components. Install clamps.

(6) Connect all deicing system tube and hose assembly interconnecting fittings. Install clamps.

(7) Install all inspection plates, access covers, and nacelle fairings that were removed.

(8) Perform operational check. Refer to paragraph 11-83c for U-8D, U-8G, and RU-8D aircraft and paragraph 11-83d for U-8F aircraft.

11-94. TIMER. The timer (7, figures 11-15 and 11-17) is installed in the nose equipment compartment and controls the sequence and duration of the inflation and deflation cycle of the deicing boots. Refer to paragraph 12-133 for maintenance operations.

SECTION IV OXYGEN SYSTEM

11-95. OXYGEN SYSTEM. (U-8D)

11-96. The oxygen system (figures 11-22 and 11-23) provides breathing oxygen for the pilot, the copilot, and 3 passengers. Oxygen is supplied from a 38.4 cubic foot, 1800 psi supply cylinder mounted on the forward side of the baggage compartment bulkhead. Oxygen from the supply cylinder is routed through 3/16-inch, high-pressure tube assemblies to an oxygen control console mounted on the fuselage above the pilot's seat. The oxygen control console consists of five oxygen distribution outlets, an oxygen system shutoff valve, an oxygen regulator control,

a regulator gage, and an oxygen supply pressure gage. To operate the oxygen system, make sure the oxygen regulator control knob is set in the full DECREASE position and slowly open the cylinder shutoff valve and the oxygen system shutoff valve. Then manually adjust the oxygen regulator control until the desired altitude registers on the regulator gage. Each distribution outlet is a separate valve which opens when the oxygen mask coupling is inserted. The oxygen supply pressure gage is used to estimate the quantity of oxygen remaining in the supply cylinder. The oxygen supply cylinder will deliver approximately 95 percent of its capacity.

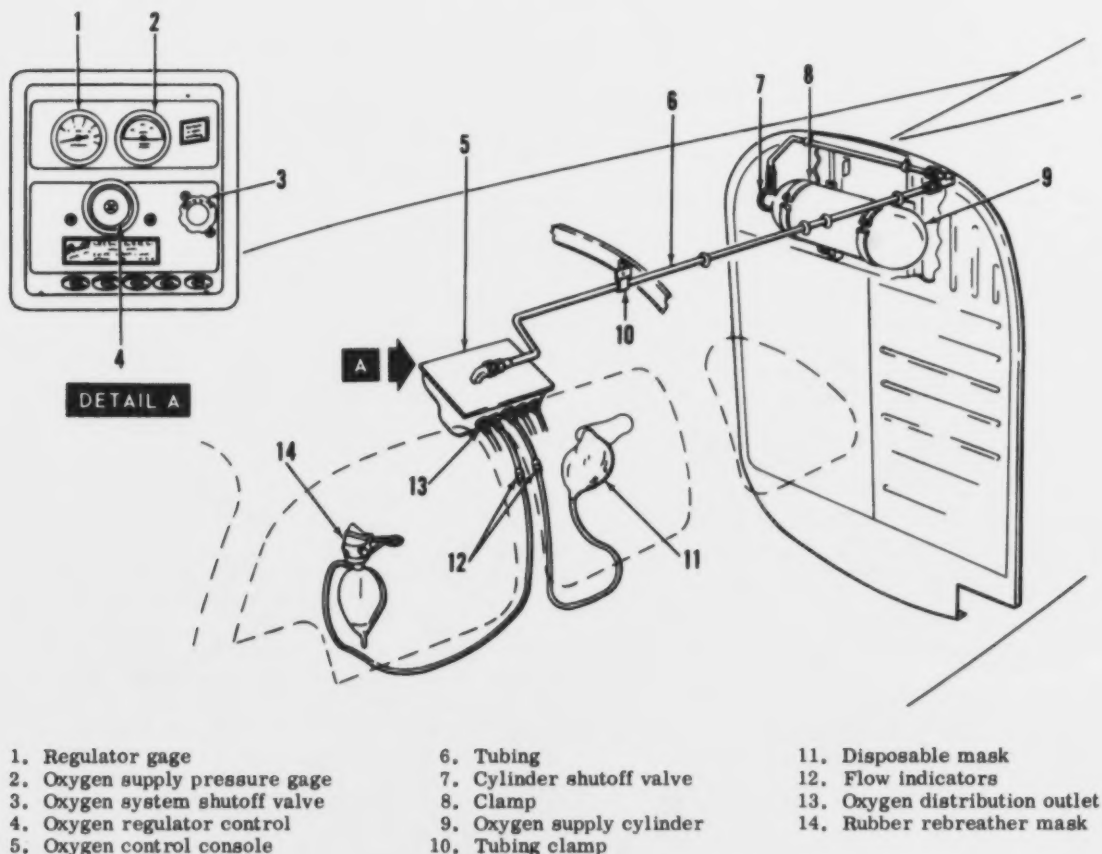


Figure 11-22. Oxygen system (U-8D)

WARNING

Read the oxygen system safety precautions outlined in paragraph 1-146 carefully before attempting any maintenance on the system.

CAUTION

Never shut off the oxygen system by just unplugging the oxygen masks. The oxygen system shutoff valve should be closed and the oxygen regulator control set to the full DECREASE position when the system is not being used.

Troubleshooting is limited to locating and replacing defective components.

11-97. OXYGEN SUPPLY CYLINDER. (U-8D)

11-98. The oxygen supply cylinder (9, figure 11-22) is clamped to the forward side of the station 211.0 bulkhead. It has a capacity of 38.4 cubic feet when charged to 1800 psi. Servicing instructions for the cylinder are covered in paragraph 1-147.

a. Removal. (1) Relieve system pressure as follows:

(a) Close cylinder shutoff valve (7, figure 11-22) on oxygen supply cylinder (9).

(b) Plug an oxygen mask coupling into an oxygen distribution outlet (13).

(c) Slowly open oxygen system shutoff valve (3), then adjust oxygen regulator control (4) to allow oxygen to escape through mask.

WARNING

Open all windows and doors to allow escaping oxygen to disperse. Ensure that all electrical systems are OFF.

(2) Disconnect oxygen tube assembly from oxygen supply cylinder (9) and cap fittings with clean metal caps.

WARNING

Do not use tape to cap open fittings.

(3) Remove oxygen supply cylinder (9) from mounting clamps (8).

11-50

b. Cleaning. (1) Wipe oxygen supply cylinder with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Dry oxygen cylinder with compressed air.

c. Inspection. (1) Inspect oxygen supply cylinder for cracks, dents, and corrosion.

(2) Inspect fitting for damaged threads.

d. Installation. (1) Secure oxygen supply cylinder (9, figure 11-22) in cylinder mounting clamps (8). Remove caps.

(2) Connect oxygen tube assembly to oxygen cylinder.

WARNING

Use only thread compound (item 43, table 1-8) on the fitting threads. Use compound sparingly and only on male fittings to keep compound out of system. Under no circumstances is an oily compound or sealer to be used.

NOTE

Ensure that oxygen system shutoff valve (3) is closed.

(3) Close oxygen system shutoff valve (3) and test system for leakage using soap solution (item 47, table 1-8). Wipe off soap with clean, damp cloth.

(4) Slowly open cylinder shutoff valve (7) and follow procedures outlined in paragraph 11-110 to clear tubing and oxygen regulator control of any dust or foreign matter that may have lodged in system.

11-99. OXYGEN REGULATOR CONTROL. (U-8D)

11-100. The constant flow type oxygen regulator control (4, figure 11-22), controlled by the regulator control knob (23, figure 11-24) on the oxygen control console (5, figure 11-22), is used to supply sea level oxygen concentrations in high altitude flight to all oxygen distribution outlets. The oxygen regulator control, housed in the oxygen control console, uses a moving stem type valve, which moves away from or toward the valve seat, to govern the oxygen pressure in the low pressure side of the regulator. An orifice in each outlet governs the flow of oxygen. A low pressure relief valve is incorporated in the regulator to prevent excessive pressure from developing in the oxygen delivery system.

a. Removal. (1) Close cylinder shutoff valve (7, figure 11-22).

(2) Plug an oxygen mask coupling into an oxygen distribution outlet (13).

(3) Slowly open oxygen system shutoff valve (3), and adjust oxygen regulator control (4) to allow oxygen to escape through mask.

WARNING

Open all windows and doors to allow escaping oxygen to disperse. Ensure that all electrical systems are OFF.

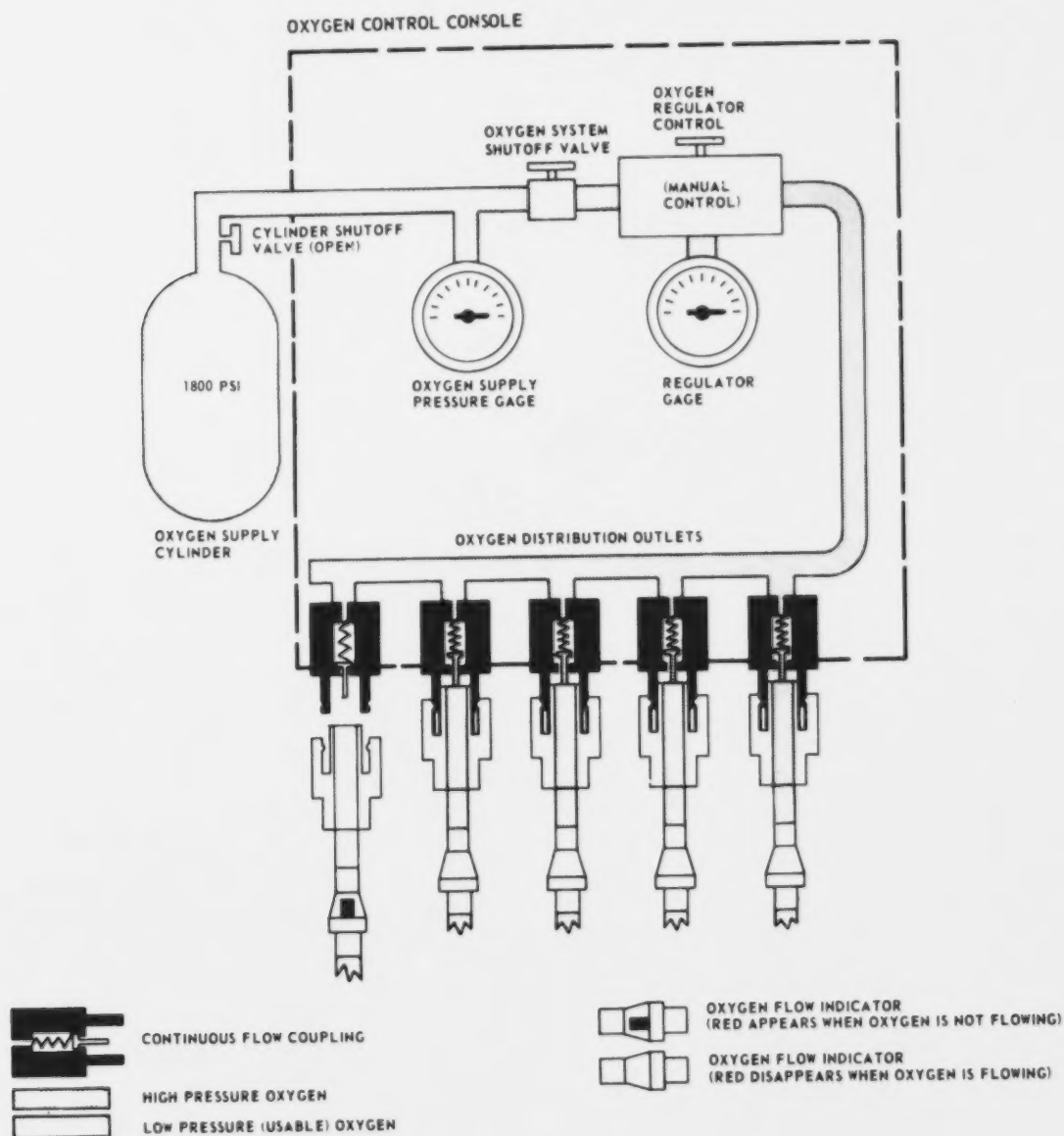


Figure 11-23. Oxygen system schematic (U-8D)

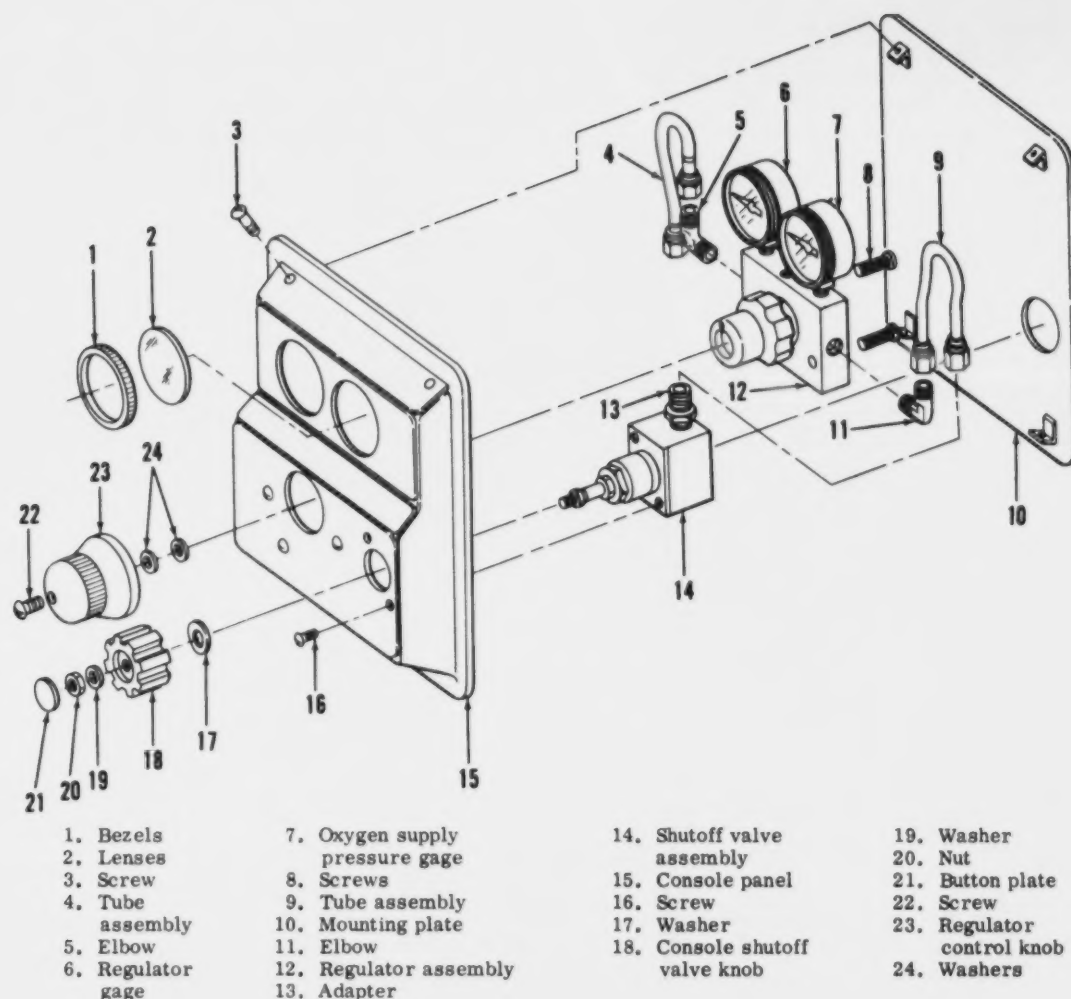


Figure 11-24. Oxygen control console

(4) Remove ceiling upholstery, as required in accordance with paragraph 4-72.

(5) Remove mounting screws from oxygen control console (5).

(6) Disconnect tubing (6) from oxygen control console (5). Cap all open fittings with clean metal caps. Remove oxygen control console from aircraft.

WARNING

Do not use tape to cap open fittings.

(7) Remove bezels (1, figure 11-24) and lenses (2) from console panel (15) and gages on regulator assembly (12).

(8) Remove screw (22), regulator control knob (23), and washers (24) from front of console panel (15) and regulator assembly (12).

(9) Remove screws (3) and mounting plate (10).

(10) Disconnect tube assemblies (4 and 9) from elbows (5 and 11) on regulator assembly (12). Cap fittings with clean metal caps.

WARNING

Do not use tape to cap open fittings.

(11) Remove screws (8) and regulator assembly (12) from console panel (15). Remove elbows (5 and 11) from regulator assembly (12).

b. Cleaning. Clean regulator assembly with cleaning compound (item 49, table 1-8).

c. Inspection. (1) Inspect regulator assembly for cracks and corrosion.

(2) Inspect ports on regulator assembly for damaged threads.

d. Installation. (1) Connect elbows (5 and 11, figure 11-24) to regulator assembly (12) and position regulator assembly against console panel (15). Secure with screws (8).

(2) Remove metal caps. Apply thread compound (item 43, table 1-8) sparingly on male threads only, and connect tube assemblies (4 and 9) to elbows (5 and 11) on regulator assembly (12).

(3) Position mounting plate (10) against console panel (15). Secure with screws (3).

(4) Secure regulator control knob (23) to regulator assembly (12) with washers (24) and screw (22).

(5) Secure lenses (2) and bezels (1) to gages on regulator assembly (12), through holes in console panel (15).

(6) Position oxygen control console (5, figure 11-22) in aircraft and remove metal caps from fittings.

(7) Apply thread compound (item 43, table 1-8) sparingly on male threads only. Connect tubing (6) to oxygen control console (5).

(8) Secure oxygen control console (5) to aircraft with mounting screws.

(9) Test system for leaks. (Refer to paragraph 11-109.) Purge oxygen system. (Refer to paragraph 11-110.)

(10) Install ceiling upholstery in accordance with paragraph 4-72.

e. Testing oxygen regulator control. (1) Close oxygen system shutoff valve (3, figure 11-22) and set oxygen regulator control (4) to the full DECREASE position.

(2) Open cylinder shutoff valve (7).

(3) Slowly open oxygen system shutoff valve (3) and note that oxygen supply pressure gage (2) indicates at least 900 psi.

(4) Plug in one oxygen mask and adjust the oxygen regulator control (4) until regulator gage (1) reads 5000 feet.

(5) Observe oxygen mask bag. It should begin to fill and red indicator in flow indicator should disappear.

(6) Increase regulator setting to 30,000 feet and at the same time notice that the flow of oxygen increases.

(7) Move the oxygen regulator control (4) to full DECREASE position and observe that oxygen ceases to flow to mask. Red indicator in flow indicator should reappear.

(8) If system fails to react as described in

steps (5) through (7), replace regulator assembly (12, figure 11-24).

11-101. OXYGEN GAGES (U-8D)

11-102. The regulator gages (1, figure 11-22) registers the desired altitude as set by the oxygen regulator control (4). The oxygen supply pressure gage (2) registers, in psi, the pressure in the oxygen supply cylinder (9). Both gages are located in the oxygen control console (5).

a. Removal. (1) Remove and disassemble oxygen regulator control. (Refer to paragraph 11-100 and figure 11-24.)

(2) Remove screws (8, figure 11-24) and regulator assembly (12) from console panel (15). Remove gage (6 or 7), from regulator assembly. Cap and plug all openings with clean metal caps and plugs.

WARNING

Do not use tape to cap openings.

b. Cleaning. Wipe gage with a clean, lint-free cloth.

c. Inspection. (1) Inspect for bent pointer.

(2) Inspect for damaged threads.

d. Installation. (1) Remove caps and plugs and screw gage (6 or 7, figure 11-24) into regulator assembly (12).

(2) Position regulator assembly (12) against console panel (15). Secure with screws (8).

(3) Accomplish steps (2) through (10) of paragraph 11-100d.

11-103. SHUTOFF VALVE ASSEMBLY. (U-8D)

11-104. The shutoff valve assembly (14, figure 11-24) is mounted on the back of console panel (15) and is manually operated by the console shutoff valve knob (18). Its function is to shut off the oxygen supply between the regulator assembly (12) and the oxygen supply cylinder.

a. Removal. (1) Accomplish steps (1) through (6) of paragraph 11-100a.

(2) Remove button plate (21, figure 11-24), nut (20), washer (19), console shutoff valve knob (18), and washer (17).

(3) Remove screws (3) and mounting plate (10).

(4) Disconnect tube assembly (9) from adapter (13) on top of shutoff valve assembly (14). Cap all open fittings with clean metal caps.

WARNING

Do not use tape to cap open fittings.

(5) Remove screws (16) and shutoff valve assembly (14). Remove adapter (13) from shutoff valve assembly (14). Cap and plug all openings.

b. Cleaning. Clean shutoff valve assembly with cleaning compound (item 49, table 1-8).

c. Inspection (1) Inspect shutoff valve assembly for cracks and corrosion.

(2) Inspect fittings for damaged threads.

d. Installation. (1) Remove metal caps and plugs and apply thread compound (item 43, table 1-8) to male threads only. Connect adapter (13, figure 11-24) to shutoff valve assembly (14).

(2) Position shutoff valve assembly (14) against aft side of console panel (15). Secure with screws (16).

(3) Remove metal caps and apply thread compound (item 43, table 1-8) to male threads only. Connect tube assembly (9) to adapter (13).

(4) Position mounting plate (10) against console panel (15). Secure with screws (3).

(5) Secure console shutoff valve control knob (18) on shaft of shutoff valve assembly (14) with nut (20), washers (17 and 19), and button plate (21).

(6) Position oxygen control console (5, figure 11-22) in aircraft. Remove metal caps from fittings.

(7) Apply thread compound (item 43, table 1-8) sparingly on male threads only. Connect tubing (8) to oxygen control console (5).

(8) Secure oxygen control console (5) to aircraft with mounting screws.

(9) Test system for leaks. (Refer to paragraph 11-109.) Purge oxygen system. (Refer to paragraph 11-110.)

(10) Install ceiling upholstery in accordance with paragraph 4-72.

11-105. OXYGEN MASK ASSEMBLY (U-8D)

11-106. Rubber rebreather type masks are furnished for the pilot and copilot. Passengers are supplied with disposable type masks. Both types have mask tubes fitted with plug-in couplings and oxygen flow indicators. The pilot's and the copilot's masks are equipped with microphone provisions. The three passenger's disposable masks are designed for one-time usage and therefore require no maintenance. A separate oxygen distribution outlet for each mask, on the oxygen control console, opens when the plug-in coupling is inserted, allowing oxygen to flow to the mask.

11-54

a. Removal. (1) Remove sponge rubber discs from mask turrets.

(2) Remove microphone from mask.

(3) Disconnect hose assembly from mask.

b. Cleaning. (1) Rinse sponge rubber discs in clean water and squeeze dry.

CAUTION

Under no circumstances should soap be used to clean the sponge rubber discs. Small particles will tend to lodge in the pores of the discs, causing the discs to be less porous, to deteriorate, and to give off unpleasant odors.

(2) Wash the rest of the mask with a solution of 1 gallon of water and one-eighth cup soap (item 23, table 1-8). Rinse thoroughly to remove all traces of soap.

NOTE

Ensure the sides of breathing bag do not stick together while drying, as this may decrease the life of the rubber in the bag. If necessary, the mask can be sterilized with a 70 percent solution of ethyl alcohol (item 48, table 1-8).

c. Inspection. (1) Inspect oxygen mask for deterioration and tears.

(2) Inspect hose assembly for deterioration, cracks, and damaged coupling.

(3) Inspect flow indicator for damage.

d. Installation. (1) Attach microphone to oxygen mask.

(2) Install rubber discs in mask turrets.

(3) Connect hose assembly to mask.

e. Maintenance Operational Check. (1) Observe safety precautions outlined in paragraph 1-146.

(2) Ensure oxygen system shutoff valve and cylinder shutoff valve are closed. Set oxygen control to full DECREASE position.

(3) Open cylinder shutoff valve slowly.

(4) Slowly open oxygen system shutoff valve and note that oxygen supply pressure gage in the oxygen control console indicates at least 900 psi.

(5) Plug oxygen mask coupling into an oxygen distribution valve and adjust oxygen regulator control until the regulator gage reads 5000 feet.

(6) The oxygen mask bag should begin to fill and the red indicator in the oxygen flow indicator should disappear.

(7) Increase oxygen regulator control setting to 30,000 feet and note that the flow of oxygen increases.

(8) Adjust oxygen regulator control to full DECREASE position and observe that oxygen ceases to flow to mask and that red indicator in oxygen flow indicator appears.

11-107. OXYGEN SYSTEM TUBE ASSEMBLIES. (U-8D)

11-108. Oxygen is routed from the oxygen supply cylinder to the oxygen system shutoff valve through two, 3/16-inch tube assemblies. (See figure 11-22.)

a. Removal. (1) Close cylinder shutoff valve (7, figure 11-22) on oxygen supply cylinder (9).

(2) Plug an oxygen mask coupling into an oxygen distribution outlet (13).

(3) Slowly open oxygen system shutoff valve (3), then adjust oxygen regulator control (4) to allow oxygen to escape through mask.

WARNING

Open all windows and doors to allow escaping oxygen to disperse. Ensure that all electrical systems are OFF.

(4) Remove necessary ceiling upholstered panels. (Refer to paragraph 4-72.)

(5) Disconnect tubing (6) from oxygen supply cylinder (9). Cap all open fittings with clean metal caps. Remove clamps.

WARNING

Do not use tape to seal open fittings.

(6) Remove mounting screws from oxygen control console (5) and disconnect tubing (6) from oxygen control console. Cap all open fittings with clean metal caps.

(7) Secure oxygen control console (5) to aircraft with mounting screws.

(8) Remove tubing clamps (10) and tubing (8).

b. Cleaning. (1) Blow tubing out with oxygen.

(2) Flush out tubing that is still dirty or that has foreign material in it, with cleaning compound (item 49, table 1-8).

(3) Dry tubing with oxygen.

c. Inspection. (1) Inspect tubing for obstructions. Replace tubing if obstructions or foreign matter can not be removed.

(2) Inspect tubing for cracks, bends, and corrosion.

(3) Inspect fittings for damaged threads.

d. Installation. (1) Apply thread compound (item 43, table 1-8) sparingly on male threads only. Connect tubing (6) to oxygen supply cylinder (9, figure 11-22).

(2) Remove mounting screws from oxygen control console (5) and connect tubing (6) to console.

(3) Connect tubing together and install clamps.

(4) Test system for leaks. (Refer to paragraph 11-109.)

(5) Clear tubing and system of any dirt or foreign matter by purging. (Refer to paragraph 11-110.)

(6) Install all upholstered panels previously removed. (Refer to paragraph 4-72.)

11-109. LEAK TEST. a. Ensure that oxygen supply cylinder is charged to at least 1500 psi.

CAUTION

Ensure oxygen system shutoff valve is closed.

b. Slowly open cylinder shutoff valve; then slowly open oxygen system shutoff valve.

c. Test all connections for leakage by application of soap solution (item 47, table 1-8). Repair system as indicated by bubbling solution and retest for possible leaks.

d. Note reading of oxygen supply pressure gage.

e. Turn off cylinder shutoff valve.

f. After 5 minutes, reread oxygen supply pressure gage and carefully note drop in pressure.

g. If pressure drop is less than 400 psi, system is sufficiently leaktight.

h. If pressure drop is greater than 400 psi, determine source of leakage as described in step c and retest system.

11-110. PURGING. The oxygen system should be purged when the system pressure falls below 50 psi, when any line is left open for any length of time, or when offensive odors are present in the oxygen. Purging is accomplished as follows:

a. Park aircraft in a NO SMOKING area.

b. Install a full oxygen supply cylinder in system.

c. Open all windows and doors in aircraft.

d. Shut off all electrical systems in aircraft.

e. Set regulator control knob at full DECREASE.

f. Open cylinder shutoff valve.

g. Slowly open oxygen system shutoff valve.
h. Plug oxygen mask connectors into all oxygen distribution outlets.

i. Set oxygen regulator control at 4,000 feet and let system purge for 1/2 hour. If odor is still present, purge for another one-half hour. Often the source of an offensive odor is the oxygen supply cylinder. If the odor persists after the second purging, replace the cylinder.

11-111. OXYGEN SYSTEM.(U-8G)

11-112. The oxygen system (figures 11-25 and 11-26) provides breathing oxygen for the pilot, the copilot, and 4 passengers. Oxygen is supplied from an oxygen supply cylinder located beneath the aft baggage compartment floorboard. When charged to the maximum pressure of 1800 psi, the cylinder has a capacity of 63.3 cubic feet. A high pressure tube assembly carries the oxygen from the supply cylinder to an oxygen pressure regulator located on the frame aft of cabin entrance door under the aft baggage compartment floorboard. The oxygen pressure regulator reduces the supply pressure to a suitable working pressure and automatically regulates this working pressure so that the proper amount of oxygen is supplied to the crew and the passengers at the varying altitudes, regardless of the number of people using oxygen. From the oxygen pressure regulator, oxygen is routed through the assemblies to oxygen distribution outlets connected in a series arrangement around the cabin and flight compartment. Oxygen is admitted to the system by opening the cylinder shutoff valve and the system shutoff valve. Inserting an oxygen mask coupling into one of the oxygen distribution outlets opens the outlet valve and permits oxygen to flow to the mask. An oxygen cylinder pressure gage, located on the aft baggage compartment bulkhead, indicates supply cylinder pressure. The oxygen supply cylinder is charged through a filler valve mounted on the frame aft of the cabin entrance door under the baggage compartment floorboard.

WARNING

Carefully read the oxygen system safety precautions outlined in paragraph 1-146, before attempting any maintenance on the system.

11-56

CAUTION

Open the cylinder shutoff valve and the system shutoff valve slowly, especially during the first turn, to prevent a rapid buildup of pressure in the supply line.

Troubleshooting is limited to locating and replacing defective components.

11-113. OXYGEN SUPPLY CYLINDER.(U-8G)

11-114. The oxygen supply cylinder (1, figure 11-25) is mounted to the underside of the aft baggage compartment floorboard. It has a capacity of 63.3 cubic feet, when charged to 1800 psi. Refer to paragraph 1-148 for charging instructions.

a. Removal. (1) Before removing oxygen supply cylinder, relieve pressure in the oxygen system as follows:

(a) Remove carpet and aft baggage compartment floorboard and close oxygen supply cylinder shutoff valve.

(b) Plug an oxygen mask coupling into one of the oxygen distribution valves. After pressure is relieved, remove coupling.

WARNING

Open all windows and doors to allow the escaping oxygen to disperse. Ensure that all electrical systems in the aircraft are off.

(2) Disconnect tube assemblies from oxygen supply cylinder. Cap all open fittings with clean metal caps.

CAUTION

Do not use tape to cap open fittings.

(3) Loosen clamp wing nuts on cylinder mounting clamps.

(4) Raise cylinder mounting clamps and remove oxygen supply cylinder.

b. Cleaning. Clean oxygen supply cylinder with dry cleaning compound (item 49, table 1-8).

c. Inspection. (1) Inspect oxygen supply cylinder for cracks, dents, and corrosion.

(2) Inspect fittings for damaged threads.

d. Installation. (1) Remove caps and clamp oxygen supply cylinder in cylinder mounting clamps.

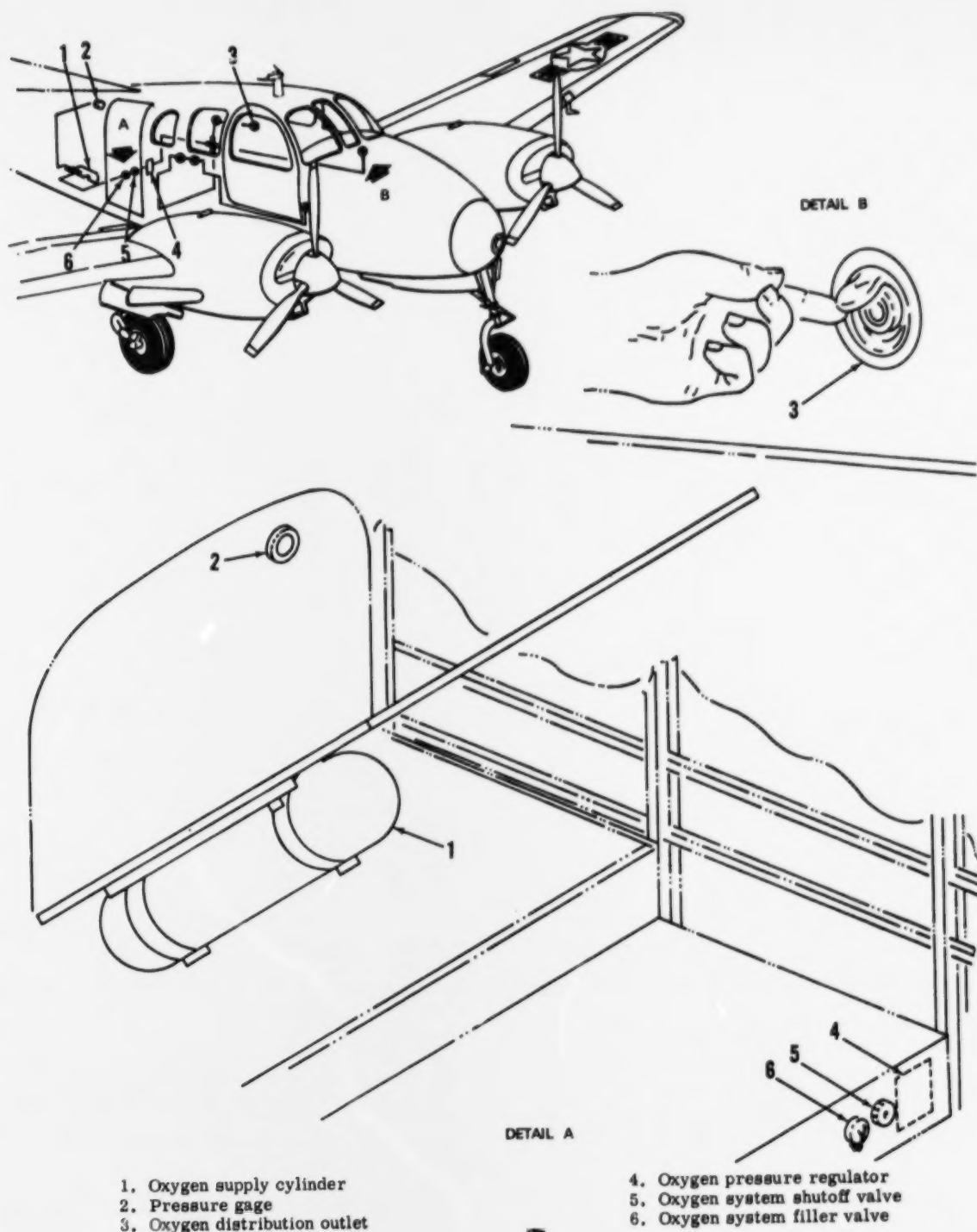


Figure 11-25. Oxygen system (U-8G)

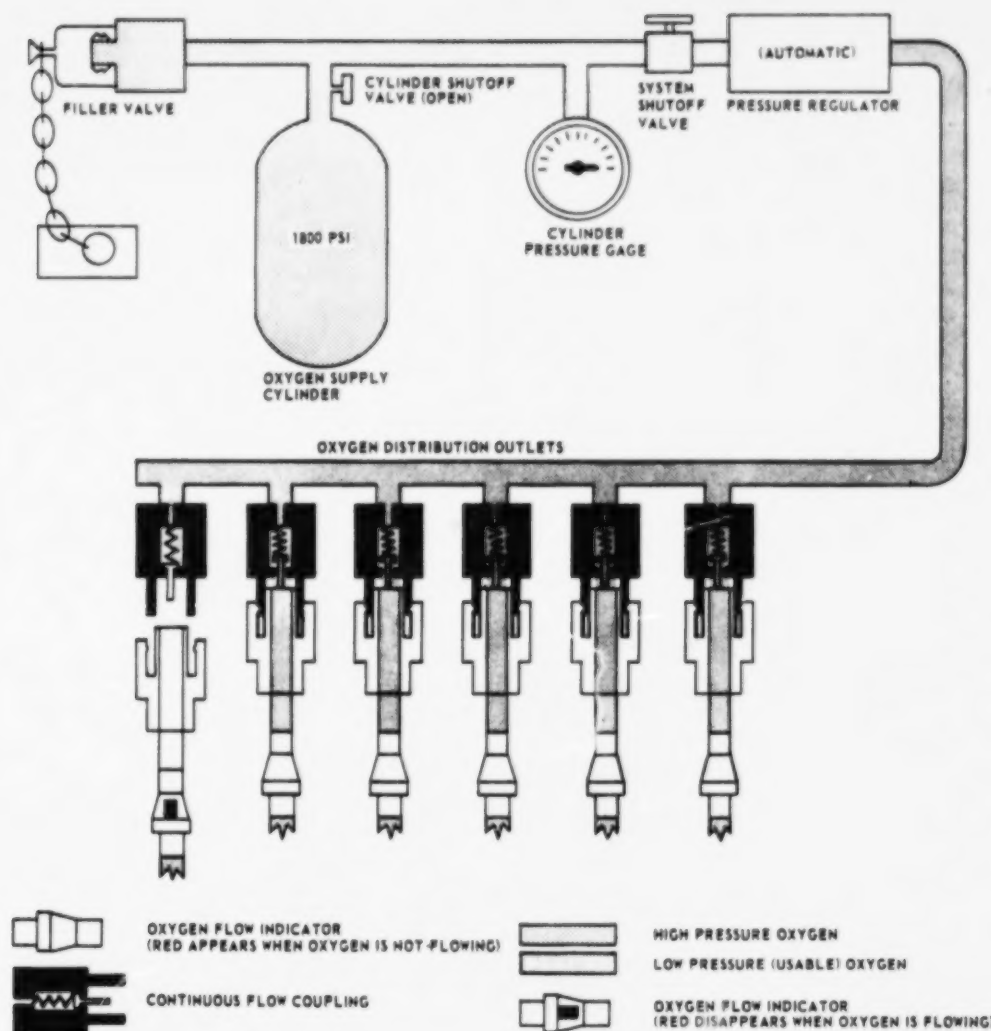


Figure 11-26. Oxygen system schematic (U-8G)

(2) Connect tube assemblies to the oxygen supply cylinder

WARNING

Use thread compound (item 43, table 1-8) on the fitting threads. Use compound sparingly and only on the male threads to keep compound out of the system. Under no circumstances is an oily compound or sealer to be used.

(3) Slowly open cylinder shutoff valve. Plug an oxygen mask into one of the oxygen distri-

bution outlets to clear tubing of any dust or foreign matter that may have entered the system.

(4) Check oxygen supply cylinder for leakage using soap solution (item 47, table 1-8).

(5) After testing, wipe off soap solution with a clean damp cloth.

(6) Install carpet and aft baggage compartment floorboard.

11-115. OXYGEN PRESSURE REGULATOR (U-8G)

11-116. The oxygen pressure regulator (4, fig-

ure 11-25) is mounted under the floorboard to the frame aft of the cabin entrance door. It reduces the pressure from the oxygen supply cylinder to a suitable working pressure, and automatically regulates this pressure so that the proper amount of oxygen is supplied to the users through fixed orifices in the outlet valves. The regulator continuously maintains the required predetermined pressure behind the oxygen distribution outlet valve orifices regardless of the altitude or the number of orifices open to oxygen flow.

a. Removal. (1) Before removing oxygen pressure regulator, relieve oxygen pressure in the system as follows:

(a) Close oxygen system shutoff valve located on frame aft of cabin entrance door.

(b) Plug an oxygen mask coupling into one of the oxygen distribution outlets. After pressure is relieved, remove coupling.

WARNING

Open cabin door and all windows to permit the escaping oxygen to disperse. Ensure that all electrical systems in the aircraft are OFF.

(2) Remove carpet and aft baggage compartment floorboard.

(3) Disconnect the supply and distribution tube assemblies. Cap all open fittings with clean metal caps.

CAUTION

Do not use tape to cap open fittings.

(4) Remove screws and washers securing oxygen pressure regulator to the frame.

b. Cleaning. Clean oxygen pressure regulator with cleaning compound (item 49, table 1-8).

c. Inspection. (1) Inspect oxygen pressure regulator for cracks and corrosion.

(2) Inspect fittings for damaged threads.

d. Installation. (1) Position oxygen pressure regulator on frame and secure with screws.

(2) Remove caps and apply thread compound (item 43, table 1-8), sparingly on the male threads only. Connect supply and distributing tube assemblies to oxygen pressure regulator.

(3) Slowly open oxygen system shutoff valve. Plug an oxygen mask coupling into one of the oxygen distribution outlets to clear tubing of any dirt or foreign matter that may have entered the system.

(4) Check oxygen pressure regulator tube connections for leakage using soap solution (item 47, table 1-8).

(5) After testing, wipe off soap solution with clean damp cloth.

(6) Install carpet and aft baggage compartment floorboard on bulkhead.

11-117. OXYGEN DISTRIBUTION OUTLETS. (U-8G)

11-118. The oxygen system has six oxygen distribution outlets (figure 11-25). Plugging an oxygen mask hose coupling into one of the outlets opens the outlet valve and permits oxygen to flow to the mask. The valve closes when the oxygen mask hose coupling is disconnected. A spring-loaded cap keeps dirt from entering the outlet when the outlet is not in use. Orifices inside the outlet valves, along with the oxygen pressure regulator, regulate the flow of oxygen to the oxygen masks. Because of the extra energy required to fly the aircraft, the pilot's and copilot's oxygen distribution outlets have larger orifices than the passengers' outlets. The pilot's and copilot's outlets have 0.018-inch diameter orifices, and the passengers' outlets have 0.016-inch diameter orifices. Orifices sizes are stamped on the body of the outlet near the tubing fittings.

a. Removal. (1) Before removing oxygen distribution outlets, relieve oxygen pressure in the system as follows:

(a) Close oxygen system shutoff valve on frame aft of cabin entrance door.

(b) Plug an oxygen mask coupling into one of the oxygen distribution outlets. After pressure is relieved, remove coupling.

WARNING

Open cabin door and all windows to allow escaping oxygen to disperse. Ensure that all electrical systems in the aircraft are OFF.

(2) Remove cabin compartment upholstered panel as necessary. (Refer to paragraph 4-129).

(3) Disconnect tube assemblies from oxygen distribution outlets. Cap all open fittings with clean metal caps.

CAUTION

Do not use tape to cap open fittings.

(4) Remove oxygen distribution outlets from retaining brackets.

b. Cleaning. (1) Wipe oxygen distribution outlets with a clean cloth.

(2) Blow out oxygen distribution outlets with oxygen.

c. Inspection. (1) Inspect oxygen distribution outlets for dents, cracks, and corrosion.

(2) Inspect fittings for damaged threads.

d. Installation. (1) Position oxygen distribution outlets having 0.018-inch diameter orifice valves in the flight compartment outlet retaining brackets, and oxygen distribution outlets having 0.016-inch diameter orifice valves in the cabin outlet retaining brackets.

(2) Remove caps and apply thread compound (item 43, table 1-8) sparingly on male threads only. Connect tube assemblies to outlet valves.

(3) Open oxygen system shutoff valve slowly. Plug an oxygen mask coupling into one of the oxygen distribution outlets to clear tubing of any dirt or foreign matter that may have entered the system.

(4) Check tube connections for leakage using soap solution (item 47, table 1-8).

(5) After testing, wipe off soap solution with clean damp cloth.

(6) Purge oxygen system in accordance with paragraph 11-142.

(7) Install flight compartment upholstered panel. (Refer to paragraph 4-129.)

11-119. OXYGEN CYLINDER PRESSURE GAGE. (U-8G)

11-120. The oxygen cylinder pressure gage (2, figure 11-25) indicates pressure in the oxygen supply cylinder and is located on the aft baggage compartment bulkhead.

a. Removal. (1) Before removing oxygen cylinder pressure gage, relieve pressure in the oxygen system as follows:

(a) Remove carpet and aft baggage compartment floorboard and close oxygen cylinder shutoff valve.

(b) Plug an oxygen mask coupling into one of the oxygen distribution outlets. After pressure is relieved, remove coupling.

WARNING

Open the cabin door and all windows to allow the escaping oxygen to disperse. Ensure that all electrical systems in the aircraft are OFF.

(2) Disconnect tube assembly from oxygen cylinder pressure gage. Cap open fittings with clean metal caps.

WARNING

Do not use tape to cap open fittings.

(3) Remove screws, washers, and nut securing gage to bulkhead.

b. Cleaning. Wipe oxygen cylinder pressure gage with a clean cloth.

c. Inspection. (1) Inspect oxygen cylinder pressure gage for cracks and corrosion.

(2) Inspect fittings for damaged threads.

d. Installation. (1) Position oxygen cylinder pressure gage to bulkhead and secure with screws, washers, and nuts.

(2) Remove caps and apply thread compound (item 43, table 1-8) sparingly on male threads only. Connect tube assembly to oxygen cylinder pressure gage.

(3) Check tube connection for leakage, using soap solution (item 47, table 1-8).

(4) After testing, wipe off soap solution with clean, damp cloth.

(5) Open oxygen cylinder shutoff valve slowly. Plug an oxygen mask coupling into one of the oxygen distribution outlets to clear tubing of any dirt or foreign matter that may have entered the system.

(6) Install carpet and aft baggage compartment floorboard.

11-121. OXYGEN MASK ASSEMBLY. (U-8G)

11-122. Rubber rebreather-type masks are furnished for the pilot and copilot. These masks are equipped with microphone provisions. Four passenger disposable masks are provided for the cabin oxygen distribution outlets. Disposable masks are designed for one-time use, and therefore, require no maintenance. Both types of masks are fitted with plug-in couplings.

a. Removal. Refer to paragraph 11-138.

b. Cleaning. Refer to paragraph 11-138.

c. Inspection. Refer to paragraph 11-138.

d. Installation. Refer to paragraph 11-138.

e. Maintenance operational check. (1) Slowly open oxygen system shutoff valve on frame aft of cabin entrance door.

(2) Plug an oxygen mask coupling into an oxygen distribution outlet.

(3) Observe for oxygen mask bag inflation and disappearance of red indicator in oxygen flow indicator.

- (4) Close oxygen system shutoff valve.
- (5) Red indicator in oxygen flow indicator should reappear.

11-123. OXYGEN TUBE ASSEMBLIES (U-8G).

11-124. Oxygen is routed from the oxygen supply cylinder to an oxygen system shutoff valve and from the valve to an oxygen pressure regulator. Tube assemblies from the regulator route the oxygen to the oxygen distribution outlets located in the cabin and flight compartment. There is also a tube assembly from the oxygen system shutoff valve to a cylinder filler valve. A tube assembly is also routed from the oxygen supply cylinder to the oxygen cylinder pressure gage located on the bulkhead behind the baggage shelf.

a. Removal. (1) Remove carpet and aft baggage compartment floorboard and close cylinder shutoff valve.

(2) Plug an oxygen mask coupling into an oxygen distribution outlet. After pressure is relieved, remove coupling.

WARNING

Open all windows and doors to allow escaping oxygen to disperse. Ensure that all electrical systems in the aircraft are OFF.

(3) Remove necessary upholstered panels in cabin and flight compartment. Remove passenger chairs, carpet, and floorboards.

(4) Disconnect tube assemblies from oxygen supply cylinder, pressure gage, regulator, filler valve and oxygen distribution outlets. Cap all open fittings with clean metal caps. Remove clamps.

CAUTION

Do not use tape to cap open fittings.

- b. Cleaning. Refer to paragraph 11-140.
- c. Inspection. Refer to paragraph 11-140.
- d. Installation. (1) Refer to paragraph 11-140.
- (2) Install upholstered panels, floorboard, carpet and chairs.
- (3) Install carpet and aft baggage compartment floorboard.

11-125. LEAK TEST. Refer to paragraph 11-141.

11-126. PURGING. Refer to paragraph 11-142.

11-127. OXYGEN SYSTEM. (U-8F)

11-128. The oxygen system (figures 11-27 and 11-28) provides breathing oxygen for the pilot, the copilot, and 4 passengers. Oxygen is supplied from an oxygen supply cylinder located beneath the baggage compartment shelf, just aft of the aft fuselage access panel. When charged to the maximum pressure of 1800 psi, the cylinder has a capacity of 63.3 cubic feet. A high pressure tube assembly carries the oxygen from the supply cylinder to an oxygen pressure regulator located beside the cylinder under the baggage compartment shelf. The oxygen pressure regulator reduces the supply pressure to a suitable working pressure and automatically regulates this working pressure so that the proper amount of oxygen will be supplied to the crew and the passengers at the varying altitudes, regardless of the number of people using oxygen. From the oxygen pressure regulator, oxygen is routed through tube assemblies to oxygen distribution outlets connected in a series arrangement around the cabin and flight compartment. Oxygen is admitted to the system by opening the cylinder shutoff valve. Inserting an oxygen mask coupling into one of the oxygen distribution outlets opens the outlet valve and permits oxygen to flow to the mask. An oxygen cylinder pressure gage, located on the baggage compartment bulkhead above the baggage shelf, indicates supply cylinder pressure. The oxygen supply cylinder is charged through a filler valve mounted on the bulkhead below the baggage shelf. Refer to paragraph 1-148 for charging instructions.

WARNING

Carefully read the oxygen system safety precautions outlined in paragraph 1-146 before attempting any maintenance on the system.

CAUTION

Open the cylinder shutoff valve slowly, especially during the first turn, to prevent a rapid buildup of pressure in the supply line.

Troubleshooting is limited to locating and replacing defective components.

11-129. OXYGEN SUPPLY CYLINDER. (U-8F)

11-130. The oxygen supply cylinder (detail C, figure 11-27), is mounted to the underside of

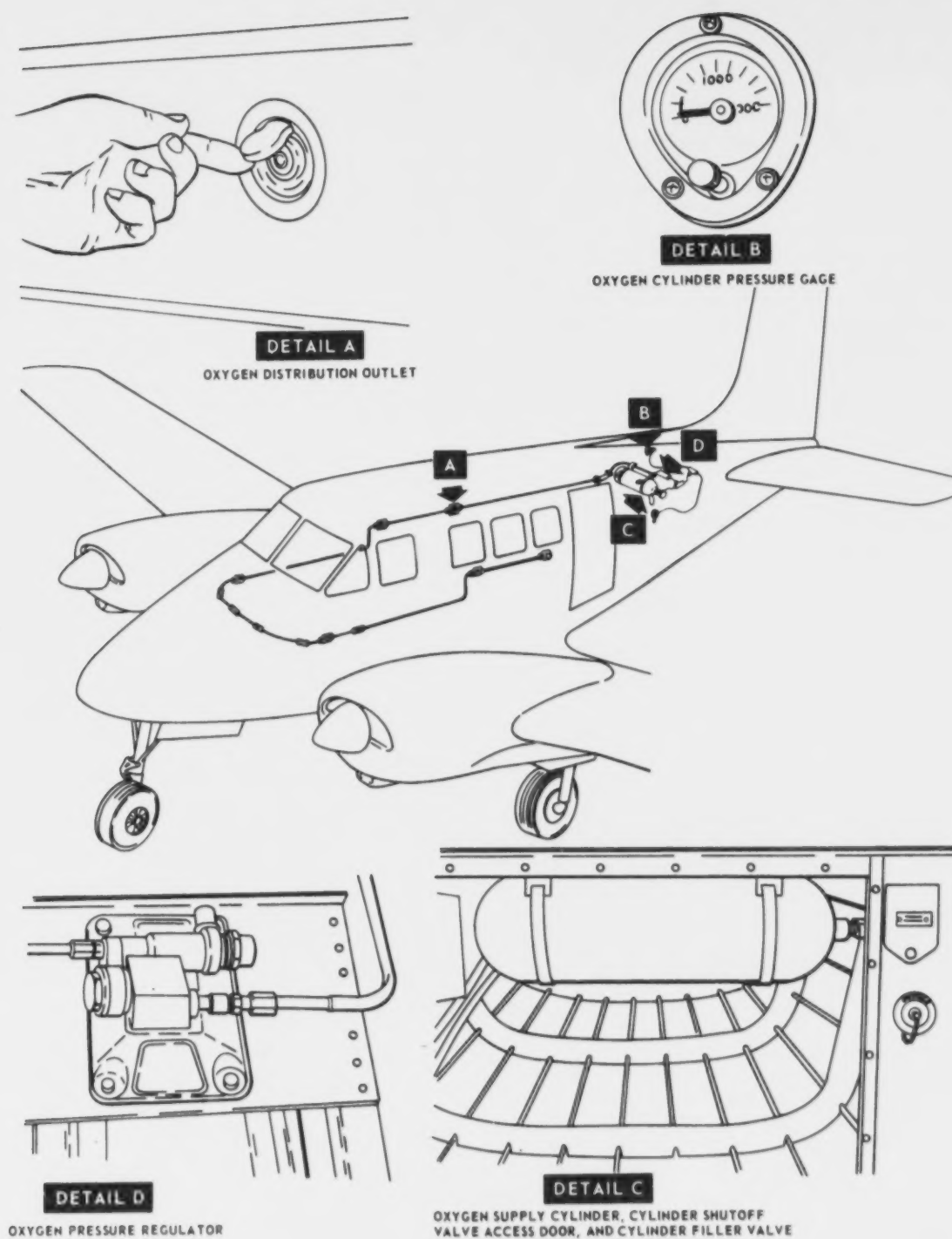


Figure 11-27. Oxygen system (U-8F)

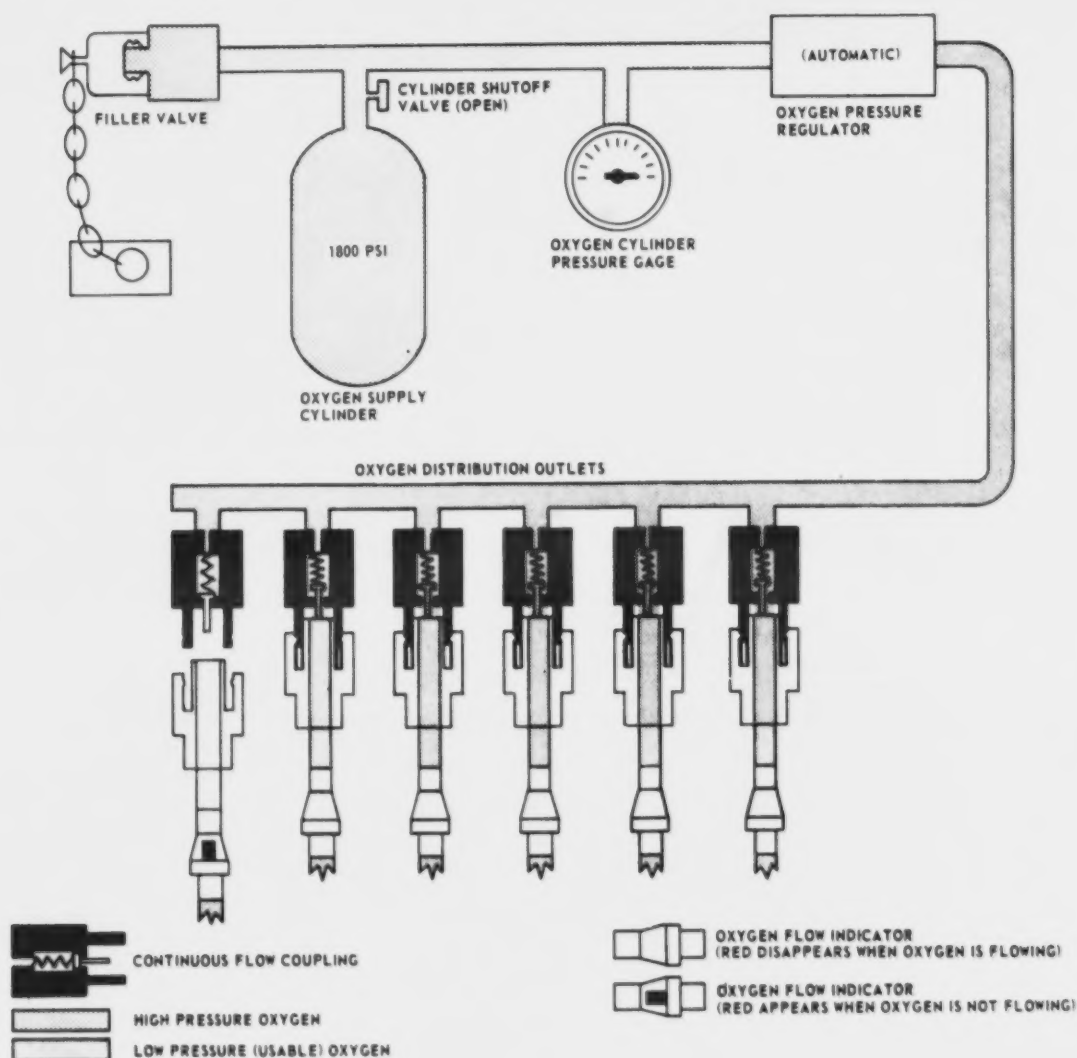


Figure 11-28. Oxygen system schematic (U-8F)

the baggage compartment shelf, just aft of the aft fuselage access panel. It has a capacity of 63.3 cubic feet, when charged to 1800 psi. Refer to paragraph 1-148 for charging instructions.

a. Removal. (1) Relieve pressure in the oxygen system as follows:

(a) Open access door on left side of bulkhead, below baggage shelf, and close cylinder shutoff valve.

(b) Plug an oxygen mask coupling into one of the oxygen distribution valves. After pressure is relieved, remove coupling.

WARNING

Open all windows and doors to allow the escaping oxygen to disperse. Ensure that all electrical systems in the aircraft are OFF.

(2) Remove access panel (detail C, figure 11-27) from bulkhead below storage shelf.

(3) Disconnect tube assemblies from oxygen supply cylinder. Cap all open fittings with clean metal caps.

CAUTION

Do not use tape to cap open fittings.

(4) Cut lock wire from the cylinder mounting clamps and loosen clamp wing nuts.

(5) Raise cylinder clamps and remove oxygen supply cylinder.

b. Cleaning. Clean oxygen supply cylinder with dry cleaning compound (item 49, table 1-8).

c. Inspection. (1) Inspect oxygen supply cylinder for cracks, dents, and corrosion.

(2) Inspect fitting for damaged threads.

d. Installation. (1) Remove caps and clamp oxygen supply cylinder in mounting clamps. Secure clamp wing nuts with lock wire.

(2) Connect tube assemblies to the oxygen supply cylinder.

WARNING

Use thread compound, (item 43, table 1-8) on the fitting threads. Use compound sparingly and only on the male threads to keep compound out of system. Under no circumstances is an oily compound or sealer to be used.

(3) Slowly open cylinder shutoff valve. Plug an oxygen mask into one of the oxygen distribution outlets to clear tubing of any dust or foreign matter that may have entered the system.

(4) Check oxygen supply cylinder for leakage using soap solution (item 47, table 1-8).

(5) After testing, wipe off soap solution with a clean, damp cloth.

(6) Install access panel on bulkhead.

11-131. OXYGEN PRESSURE REGULATOR. (U-8F)

11-132. The oxygen pressure regulator (detail D, figure 11-27) is mounted to the underside of the baggage compartment shelf, just aft of the baggage compartment bulkhead. It reduces the pressure from the oxygen supply cylinder to a suitable working pressure, and automatically regulates this pressure so that the proper amount of oxygen will be supplied to the users through fixed orifices in the outlet valves. The regulator continuously maintains the required predetermined pressure behind the oxygen distribution outlet valve orifices regardless of the altitude or the number of orifices open to oxygen flow.

a. Removal. (1) Relieve oxygen pressure in the system as follows:

(a) Remove access panel from bulkhead below baggage and close cylinder shutoff valve.

(b) Plug an oxygen mask coupling into one of the oxygen distribution outlets. After pressure is relieved, remove coupling.

WARNING

Open cabin door and all windows to permit the escaping oxygen to disperse. Ensure that all electrical systems in the aircraft are OFF.

(2) Remove access panel from bulkhead, below baggage shelf.

(3) Disconnect the supply and distributing tube assemblies. Cap all open fittings with clean metal caps.

CAUTION

Do not use tape to cap open fittings.

(4) Remove screws and washers securing oxygen pressure regulator mounting plate to the aircraft.

(5) Remove screws securing regulator to mounting plate.

b. Cleaning. Clean oxygen pressure regulator with cleaning compound (item 49, table 1-8).

c. Inspection. (1) Inspect oxygen pressure regulator with cleaning compound (item 49, table 1-8).

(2) Inspect fittings for damaged threads.

d. Installation. (1) Position oxygen pressure regulator on mounting plate and secure with screws.

(2) Secure mounting plate to aircraft with screws and washers.

(3) Remove caps and apply thread compound (item 43, table 1-8) sparingly on male threads only. Connect supply and distributing tube assemblies to oxygen pressure regulator.

(4) Slowly open cylinder shutoff valve. Plug an oxygen mask coupling into one of the oxygen distribution outlets to clear tubing of any dirt or foreign matter that may have entered the system.

(5) Check oxygen pressure regulator tube connections for leakage using soap solution (item 47, table 1-8).

(6) After testing, wipe off soap solution with clean damp cloth.

g. Install access panel on bulkhead.

11-133. OXYGEN DISTRIBUTION OUTLETS. (U-8F)

11-134. The oxygen system has six oxygen distribution outlets (detail A, figure 11-25). Plugging an oxygen mask hose coupling into one of the outlets opens the outlet valve and permits oxygen to flow to the mask. The valve closes again when the oxygen mask hose coupling is disconnected. A spring-loaded cap keeps dirt from entering the outlet when the outlet is not in use. Orifices inside the outlet valves along with the oxygen pressure regulator, regulate the flow of oxygen to the oxygen masks. Because of the extra energy required to fly the aircraft, the pilot's and copilot's oxygen distribution outlets have 0.018-inch diameter orifices and the cabin outlets have 0.016-inch diameter orifices. Orifice sizes are stamped on the body of the outlet near the tubing fittings.

a. Removal. (1) Relieve oxygen pressure in the system as follows:

(a) Remove access panel from bulkhead and close cylinder shutoff valve.

(b) Plug an oxygen mask coupling into one of the oxygen distribution outlets. After pressure is relieved, remove coupling.

WARNING

Open cabin door and all windows to allow escaping oxygen to disperse. Ensure that all electrical systems in the aircraft are OFF.

(2) Remove flight and cabin compartment upholstered panels as necessary (Refer to paragraphs 4-169 and 4-199).

(3) Disconnect tube assemblies from oxygen distribution outlets. Cap all open fittings with clean metal caps.

CAUTION

Do not use tape to cap open fittings.

(4) Remove oxygen distribution outlets from retaining brackets.

b. Cleaning. (1) Wipe oxygen distribution outlets with a clean cloth.

(c) Blow out oxygen distribution outlets with oxygen.

c. Inspection. (1) Inspect oxygen distribution outlets for dents, cracks, and corrosion.

(2) Inspect fittings for damaged threads.

d. Installation. (1) Position oxygen distribution

outlets having 0.018-inch diameter orifice valves in the flight compartment outlet retaining brackets, and oxygen distribution outlets having 0.016-inch diameter orifice valves in the cabin outlet retaining brackets.

(2) Remove caps and apply thread compound (item 42, table 1-8) sparingly on male threads only. Connect tube assemblies to outlet valves.

(3) Open cylinder shutoff valve slowly. Plug an oxygen mask coupling into one of the oxygen distribution outlets to clear tubing of any dirt or foreign matter that may have entered the system.

(4) Check tube connections for leakage using soap solution (item 47, table 1-8).

(5) After testing, wipe off soap solution with clean, damp cloth.

(6) Purge oxygen system in accordance with paragraph 11-142.

(7) Install cabin and flight compartment upholstered panels. (Refer to paragraphs 4-169 and 4-199.)

(8) Install access panel on bulkhead.

11-135. OXYGEN CYLINDER PRESSURE GAGE. (U-8F)

11-136. The oxygen cylinder pressure gage (detail B, figure 11-27) indicates psi pressure in the oxygen supply cylinder and is located on the aft baggage compartment bulkhead.

a. Removal. (1) Relieve pressure in the oxygen system as follows:

(a) Open access door on left side of bulkhead, below baggage shelf, and close cylinder shutoff valve.

(b) Plug an oxygen mask coupling into one of the oxygen distribution outlets. After pressure is relieved, remove coupling.

WARNING

Open the cabin door and all windows to allow the escaping oxygen to disperse. Ensure that all electrical systems in the aircraft are OFF.

(2) Remove upholstered panel from behind baggage shelf. (Refer to paragraph 4-216.)

(3) Disconnect tube assembly from oxygen cylinder pressure gage. Cap open fittings with clean metal caps.

WARNING

Do not use tape to cap open fittings.

(4) Remove screws, washers, and nuts securing gage to ring. Remove oxygen cylinder pressure gage.

b. Cleaning. Wipe oxygen cylinder pressure gage with clean cloth.

c. Inspection. (1) Inspect oxygen cylinder pressure gage for cracks, and corrosion.

(2) Inspect fittings for damaged threads.

d. Installation. (1) Position oxygen cylinder pressure gage in ring, and secure with screws, washers, and nuts.

(2) Remove caps and apply thread compound (item 43, table 1-8) sparingly on male threads only. Connect tube assembly to oxygen cylinder pressure gage.

(3) Check tube connection for leakage, using soap solution (item 47, table 1-8).

(4) After testing, wipe off soap solution with clean, damp cloth.

(5) Install upholstered panel behind baggage shelf. (Refer to paragraph 4-216.) Close cylinder shutoff valve access door on bulkhead.

11-137. OXYGEN MASK ASSEMBLY. (U-8F)

11-138. Rubber rebreather type masks are furnished for the pilot and copilot. These masks are equipped with microphone provisions. Four passenger disposable masks are provided for the cabin oxygen distribution outlets. These masks are designed for one-time use, and therefore, require no maintenance. Both types of masks are fitted with plug-in couplings.

a. Removal. (1) Unplug oxygen mask assemblies or remove from stowed position.

(2) Remove sponge rubber discs from mask turrets.

(3) Remove microphone from oxygen mask assembly.

(4) Remove hose assembly from oxygen mask assembly.

b. Cleaning. (1) Rinse sponge rubber discs in clean water and squeeze dry.

CAUTION

Under no circumstances should soap be used to clean the sponge rubber discs. Small particles will tend to lodge in the pores of the discs causing the discs to be less porous, to deteriorate, and to give off unpleasant odors.

(2) Wash remainder of oxygen mask assembly with a solution of 1 gallon of water and one-eighth cup soap (item 23, table 1-8). Rinse

thoroughly to remove all traces of soap.

NOTE

Ensure that sides of breathing bag do not stick together while drying, as this may decrease life of rubber in the bag. If necessary, mask can be sterilized with a 70-percent solution of ethyl alcohol (item 48, table 1-8).

c. Inspection. (1) Inspect oxygen mask assembly for deterioration and tears.

(2) Inspect hose assembly for deterioration, cracks, and damaged coupling.

(3) Inspect flow indicator for damage.

d. Installation. (1) Attach microphone to oxygen mask assembly.

(2) Install rubber discs in mask turrets.

(3) Attach hose assembly to mask.

e. Maintenance Operational Check. (1) Open cylinder shutoff valve access door on left side of bulkhead, below baggage shelf.

(2) Slowly open cylinder shutoff valve.

(3) Plug an oxygen mask coupling into an oxygen distribution outlet.

(4) Observe for oxygen mask bag inflation and disappearance of red indicator in oxygen flow indicator.

(5) Close cylinder shutoff valve, and close access door on bulkhead.

(6) Red indicator in oxygen flow indicator should reappear.

11-139. OXYGEN SYSTEM TUBE ASSEMBLIES. (U-8F)

11-140. Oxygen is routed from the oxygen supply cylinder to an oxygen pressure regulator and from the regulator to oxygen distribution outlets located in the cabin and flight compartment. There is also a tube assembly from the oxygen supply cylinder to a cylinder filler valve located on the left side of the bulkhead below the baggage shelf. A tube assembly is also routed from the oxygen supply cylinder to the oxygen cylinder pressure gage located on the bulkhead behind the baggage shelf.

a. Removal. (1) Remove access panel from bulkhead, below baggage shelf, and close cylinder shutoff valve.

(2) Plug an oxygen mask coupling into an oxygen distribution outlet. After pressure is relieved, remove coupling.

WARNING

Open all windows and doors to allow escaping oxygen to disperse. Ensure that all electrical systems in the aircraft are OFF.

(3) Remove necessary upholstered panels in cabin and flight compartment. (Refer to paragraphs 4-169 and 4-199.)

(4) Disconnect tube assemblies from oxygen supply cylinder and oxygen distribution outlets. Cap all open fittings with clean metal caps. Remove clamps.

CAUTION

Do not use tape to cap open fittings.

b. Cleaning. (1) Blow tube assemblies out with oxygen.

(2) Flush out tube assemblies that are still dirty or that have foreign material in them, with cleaning compound (item 49, table 1-8).

(3) Dry tube assemblies with oxygen.

c. Inspection. (1) Inspect tube assemblies for obstructions. Replace tube assemblies if obstructions or foreign matter cannot be removed.

(2) Inspect tube assemblies for cracks, bends, and corrosion.

(3) Inspect fittings for damaged threads.

d. Installation. (1) Remove caps and apply thread compound (item 43, table 1-8) sparingly on male threads only. Connect tube assemblies to oxygen supply cylinder and oxygen distribution outlets.

(2) Check for leakage. (Refer to paragraph 11-141.)

(3) Clear tube assemblies and system of any dirt or foreign matter by purging. (Refer to paragraph 11-142.)

(4) Install all upholstered cabin and flight

compartment panels that were removed. (Refer to paragraphs 4-169 and 4-199).

11-141. LEAK TEST. a. Ensure that oxygen supply cylinder is charged to at least 1500 psi.

b. Open cylinder shutoff valve.

c. Test all connections for leakage by application of soap solution (item 47, table 1-8). Repair system as indicated by bubbling solution and retest for possible leaks.

d. Note reading of oxygen cylinder pressure gage.

e. Turn off cylinder shutoff valve.

f. After 5 minutes, reread oxygen cylinder pressure gage and carefully note drop in pressure.

g. If pressure drop is less than 400 psi, system is sufficiently leak-tight.

h. If pressure drop is greater than 400 psi, determine source of leakage as described in step c and retest system.

11-142. PURGING. The oxygen system should be purged when the oxygen supply cylinder pressure falls below 50 psi, when any line is left open for any length of time, or when offensive odors are present. Purging is accomplished as follows:

a. Park aircraft in a NO SMOKING area.

b. Open cabin door and windows.

c. Shut off all electrical systems in aircraft.

d. Connect recharging cart to aircraft filler valve.

e. Plug oxygen masks into oxygen distribution outlets.

f. Set recharging cart pressure regulator to deliver 50 psi and let system purge for 1 hour. If odor is still present, allow system to purge for an additional hour. If odor persists after second purging, replace oxygen supply cylinder.

SECTION V FIRE DETECTOR SYSTEM

Not Applicable

SECTION VI FIRE EXTINGUISHER SYSTEM

11-143. DESCRIPTION.

11-144. The fire extinguisher system consists of a portable fire extinguisher. Ten static dischargers on the aircraft control surfaces provide protection from fire by preventing buildup of static electricity.

11-145. FIRE EXTINGUISHER.

11-146. One pressurized monobromotrifluoromethane (CF₃Br) fire extinguisher is mounted on the cabin floor of U-8D, U-8G, and RU-8D aircraft just forward of the front passenger seat. On U-8F aircraft, the fire extinguisher is mounted on the cabin bulkhead, just forward of the cabin access door. The CF₃Br fire extinguisher is charged to a pressure of 150 to 175 psi.

WARNING

Monobromotrifluoromethane (CF₃Br) is very volatile, but is not easily detected by its odor. Although nontoxic, it must be considered to be about the same as other freons and carbon dioxide, causing danger to personnel primarily by reduction of oxygen available for proper breathing. During operation of the fire extinguisher, ventilate personnel areas with fresh air. The liquid should not be allowed to come into contact with the skin, as it may cause frostbite or low temperature burns because of its very low boiling point.

a. Removal. Open retaining clip and remove fire extinguisher from mounting bracket.

b. Cleaning. Wipe fire extinguisher with a clean cloth, dampened with dry cleaning solvent (item 6, table 1-8).

NOTE

The CF₃Br fire extinguisher cylinder is an expendable item and should be disposed of in lieu of being returned for recharging.

c. Inspection. (1) Inspect fire extinguisher for broken or missing seal.

(2) Inspect fire extinguisher for leaks.

(3) Inspect fire extinguisher by weighing every 6 months. If fire extinguisher is under the weight indicated on instruction plate, replace fire extinguisher.

NOTE

The fire extinguisher should be within 4 ounces of its capacity.

(4) Inspect mounting bracket and retaining clip for cracks and distortion.

d. Installation. Install fire extinguisher in mounting bracket and secure with retaining clip.

11-147. STATIC DISCHARGERS.

11-148. Ten static dischargers are installed on the control surfaces of the aircraft. Two static dischargers are installed on the outboard trailing edge of each elevator, one on the outboard trailing edge of each aileron, two on the trailing edge of the rudder, and one on the outboard edge of each wing tip.

a. Removal. Remove screws and washers. Remove static dischargers from airframe surface.

b. Inspection. Fraying, deterioration, discoloration (exposed wick for white condition), and length (minimum of 6-inches), measuring from trailing edge of discharger wick. The trailing edge of discharger must have a minimum of 1-inch of plastic sheath removed exposing discharger wick. Inspect exposed wick for discoloration (white condition).

c. Installation. Position static dischargers on airframe surface, and secure with screws and washers.

SECTION VII DEFROSTER SYSTEM

11-149. DESCRIPTION.

11-150. (See figures 11-1, 11-2, 11-3, 11-4, 11-7, and 11-8). The defrosting systems for the U-8D, U-8G, RU-8D, and U-8F aircraft provide for windshield defrosting. The defrosting system consists of flexible and rigid ducts, shutoff valves, and manual valve controls. Each system receives its warm air supply from the heating system. With the heater on and the shutoff valves open, warm air from the warm air plenum in the U-8D, U-8G, and RU-8D aircraft, or from the warm air box in the U-8F aircraft, is directed through the defrosting ducts terminating at the pilot's and copilot's defroster outlets below the windshield.

11-151. DEFROSTING SYSTEM. (U-8D, U-8G, RU-8D)

11-152. The defrosting system for U-8D, U-8G, and RU-8D aircraft consists of a flexible duct, routed from the warm air plenum to a Y-shaped defrosting duct terminating at the windshield; two defroster shutoff valves, one in each branch of the duct; and two push-pull control knobs connected to the valve by control cables. Pulling the PILOTS DEFROSTER SHUT-OFF control or COPILOTS DEFROSTER SHUT-OFF control out opens the respective shutoff valve, allowing warm air to flow from the Y-shaped duct, onto the pilot's or copilot's windshield.

11-153. FLEXIBLE DEFROSTING DUCT. (U-8D, U-8G, RU-8D)

11-154. The flexible defrosting duct (12, figure 11-1 and 11-3) is used to direct warm air from the warm air plenum (23) to the single end of the Y-shaped defrosting duct (3). Hose clamps attach the flexible defrosting duct to the warm air plenum and the Y-shaped defrosting duct.

a. Removal. (1) Loosen clamps securing flexible defrosting duct (12, figure 11-1 and 11-3) to warm air plenum (23) and single end of Y-shaped defrosting duct (3).

(2) Slide clamps up onto flexible defrosting duct. Remove duct and clamps.

b. Cleaning. Blow dirt from flexible duct with compressed air.

c. Inspection. Inspect flexible duct for breaks, tears, chafing, and deterioration.

d. Installation. (1) Slip clamps over flexible defrosting duct (12).

(2) Position flexible defrosting duct (12) on warm air plenum (23) and single end of Y-shaped defrosting duct (3).

(3) Position clamps and secure flexible defrosting duct at both ends.

11-155. DEFROSTING DUCT. (U-8D, U-8G, RU-8D)

11-156. A Y-shaped defrosting duct (3, figure 11-1 and 11-3) connected at one end to the flexible defrosting duct, and terminating at the other end in two defrosting outlets, provides the means for directing warm air to the pilot's and copilot's windshield areas. Defrosting shutoff valves controlled by push-pull control knobs are installed in each discharge duct.

a. Removal. (1) Loosen clamp securing flexible defrosting duct (12, figure 11-1 and 11-3) to single end of Y-shaped defrosting duct (3). Slip clamp onto flexible defrosting duct and disconnect flexible duct from defrosting duct. Remove clamp.

(2) Remove nuts, washers, pins, and bushings connecting control cables to defrosting shutoff valves.

(3) Slip defrosting duct from openings under windshield and remove Y-shaped defrosting duct.

b. Cleaning. (1) Blow dirt from duct with compressed air.

(2) Clean exterior of duct with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. Inspect defrosting duct for cracks or breaks.

d. Installation. (1) Slip outlet ends of Y-shaped defrosting duct (3) into openings under windshield.

(2) Slip clamp over flexible defrosting duct (12) and connect flexible defrosting duct to Y-shaped defrosting duct (3) securing with clamp.

(3) Connect control cables to defrosting shutoff valves with nuts, washers, pins, and bushings.

11-157. PUSH-PULL CONTROLS. (U-8D, U-8G, RU-8D)

11-158. Push-pull type control knobs attached by control cables to shutoff valves in the Y-shaped defrosting duct, provide for the opening and closing of the shutoff valves.

a. Removal. (1) Remove nuts, washers, pins, and bushings connecting control cables to defrosting shutoff valves.

(2) Remove cable clamps routing control cables from push-pull controls to defrosting shutoff valves.

(3) Disconnect control cable from push-pull knob by removing screw, lock button, and bushing.

(4) Remove screw from push-pull control stop and slide stop from cable. Remove cable.

(5) Pull push-pull knob from guide.

b. Cleaning. Clean cable housing and control knob with clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect cable housing for breaks.

(2) Inspect cable for kinks and ease of cable travel in housing.

d. Installation. (1) Position push-pull knob in guide.

(2) Slide push-pull control stop onto cable and install screw. Do not tighten screw.

(3) Connect control cable to push-pull knob with screw, lockbutton, and bushing.

NOTE

To prevent reversed operation of defrosting control valve, assure cable is properly connected.

(3A) Place defrosting control valve to open position and pull control knob to out position.

(4) Connect end of control cable to defrosting shutoff valve with nuts, washers, pins, and bushings.

(5) Place control cables in cable clamps and secure.

(6) Adjust push-pull control stop and secure by tightening screw.

11-159. DEFROSTING SYSTEM. (U-8F)

11-160. The defrosting system for the U-8 Faircraft consists of a Y-shaped defrosting duct, routed from the warm air box and terminating at the windshield defroster outlets; a defroster shutoff valve, located at the root of the defroster duct; and a push-pull control knob connected

to the shutoff valve by a control cable. Pulling the PILOTS DEFROSTER SHUT-OFF control or COPILOTS DEFROSTER SHUT-OFF control in opens the shutoff valve allowing warm air to flow from the warm air box, through the Y-shaped duct onto the pilot's and copilot's windshield.

11-161. DEFROSTING DUCT. (U-8F)

11-162. A Y-shaped defrosting duct (6, figure 11-7), connecting at one end to a warm air box (11) and terminating at the other end in two defrosting outlets, provides the means for directing warm air to the pilot's and copilot's windshield areas. A defrosting shutoff valve controlled by a push-pull control knob is installed in the single end of the defrosting duct.

a. Removal. (1) Remove nut, washer, pin, and bushing connecting control cables to defrosting shutoff valves.

(2) Slip defrosting duct (6, figure 11-7) from openings under windshield and work assembled duct into position to dismantle. Break down defrosting duct by pulling interconnecting pieces apart.

b. Cleaning. (1) Blow dirt from defrosting duct with compressed air.

(2) Clean exterior of defrosting duct with a clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. Inspect defrosting duct for cracks or breaks.

d. Installation. (1) Position Y portion of defrosting duct (6, figure 11-7) behind instrument panel and assemble remaining interconnecting ducts to Y.

(2) Connect single end of defrosting duct (6) to warm air box (11) and slip outlet ends of duct into openings under windshield.

(3) Connect control cable to defrosting shutoff valve with nut, washer, pin, and bushing.

11-163. PUSH-PULL CONTROLS. (U-8F)

11-164. A push-pull type control knob, attached by a control cable to the shutoff valve in the single end of the defrosting duct, provides for opening and closing of the shutoff valve.

a. Removal. (1) Remove nut, washer, pin, and bushing connecting control cable to defrosting shutoff valve.

(2) Remove cable clamps routing control cable from push-pull control to defrosting shutoff valve.

(3) Disconnect control cable from push-pull knob by removing screw.

(4) Remove screw from push-pull control stop and slide stop from cable. Remove cable.

- (5) Pull push-pull knob from instrument panel.
- b. Cleaning. Clean cable housing and control knob with clean cloth dampened with dry cleaning solvent (item 6, table 1-8).
- c. Inspection. (1) Inspect cable housing for breaks.

(2) Inspect cable for kinks and ease of cable travel in housing.

d. Installation. (1) Slide push-pull control stop onto cable and install screw. Do not tighten screw.

(2) Place push-pull knob through hole in instrument panel.

(3) Connect control cable to push-pull knob with screw.

NOTE

To prevent reversed operation of defrosting control valve, assure cable is properly connected.

(3A) Place defrosting control valve to open position and pull control knob to out position.

(4) Connect end of control cable to defrosting shutoff valve with nuts, washers, pins, and bushings.

(5) Place control cables in cable clamps and secure.

(6) Adjust push-pull control stop and secure by tightening screw.

SECTION VIII WINDSHIELD WIPER SYSTEM

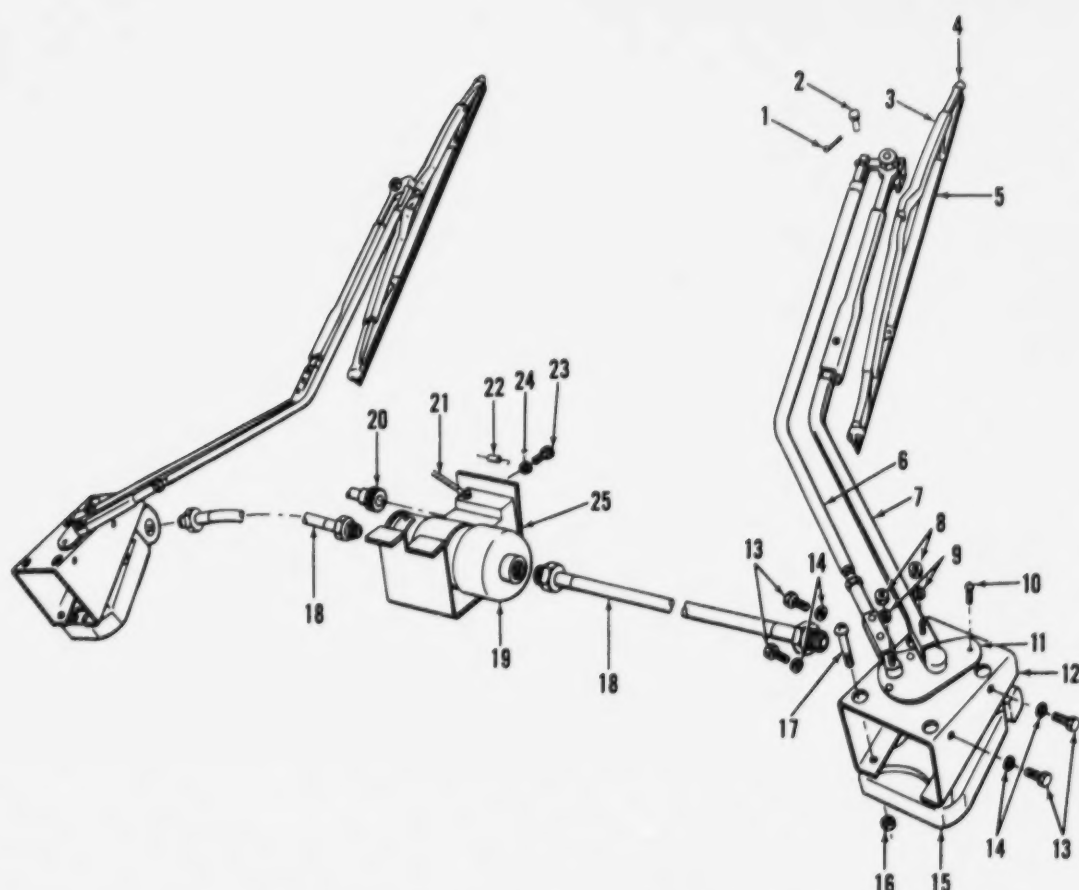
11-165. DESCRIPTION.

11-166. Two variable speed, motor-driven windshield wipers (figure 11-29) are installed on the U-8F aircraft to provide maximum visibility during inclement weather. A one-eighth horsepower motor (19), using flexible drive assemblies (18) and converters (15), powers the windshield wiper assemblies. Windshield wiper speed is controlled by a switch located on the

left-hand side of the pilot's instrument panel. Circuit protection is accomplished by a 5-ampere circuit breaker located on the right-hand instrument subpanel. The U-8D, U-8G, and RU-8D aircraft do not have windshield wipers.

a. Troubleshooting. Troubleshooting consists of locating and correcting failure or unsatisfactory operation of the windshield wiper system. The following procedures list the most common troubles, probable causes and possible remedies.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Windshield wipers inoperative	Circuit breaker tripped	Reset circuit breaker. If circuit breaker trips repeatedly, replace circuit breaker. (Refer to paragraph 12-21.)
	Open circuit	Check continuity.
	Inoperative motor	Replace control switch. (Refer to paragraph 12-19.)
	Defective motor	Replace motor. (Refer to paragraph 11-164.)
Either wiper blade inoperative	Inoperative flexible drive assembly	Replace defective flexible drive assembly. (Refer to paragraph 11-164.)
	Inoperative converter	Replace defective converter. (Refer to paragraph 11-165.)



- | | | | | |
|-------------------------|------------------------|--------------------------------|-----------------------------|----------------------------|
| 1. Cotter pin | 7. Wiper arm | 12. Converter mounting bracket | 17. Screw | 21. Ground wire |
| 2. Pin | 8. Nuts | 13. Bolts | 18. Flexible drive assembly | 22. Resistor |
| 3. Wiper blade arm | 9. Washers | 14. Washers | 19. Motor | 23. Bolt |
| 4. Wiper blade assembly | 10. Screw | 15. Converter | 20. Electrical connector | 24. Washer |
| 5. Wiper blade | 11. Link weld assembly | 16. Nut | | 25. Motor mounting bracket |
| 6. Link arm | | | | |

Figure 11-29. Windshield wiper installation (U-8F)

b. Removal. (1) Swing wiper blade assembly (4, figure 11-29) up, and disconnect from wiper arm (7).

(2) Remove wiper blade (5) from wiper blade arm (3) by pulling out on blade locking clips located on each end of wiper blade arm.

(3) Remove nuts (8) and washers (9). Remove wiper arm (7), with link arm (6) attached, from link weld assembly (11).

(4) Remove cotter pin (1) from pin (2) and separate link arm (6) from wiper arm (7).

(5) Remove screws (10) attaching link weld assembly (11) to fuselage. Detach link weld

assembly from shaft of converter (15).

(6) Remove radio control panels from center of instrument panel.

(7) Cut lock wire from each end of flexible drive assembly (18), and disconnect drive assembly from converter (15) and motor (19).

(8) Remove bolts (13), washers (14), and converter mounting bracket (12) with converter (15) attached.

(9) Remove screws (17) and nuts (16) and separate converter (15) from converter mounting bracket (12).

(10) Disconnect electrical connector (20)

from motor (19).

(11) Disconnect ground wire (21) from fuselage.

(12) Cut lock wire and remove bolts (23), washer (24), and resistor (22) from motor mounting bracket (25). Remove bracket and motor.

c. Cleaning. (1) Clean wiper blade with clean, lint-free cloth.

(2) Clean metal windshield wiper components and motor with a clean cloth dampened in dry cleaning solvent (item 6, table 1-8).

(3) Allow metal components to air-dry. Remove residue by wiping with a clean, dry cloth.

d. Inspection. (1) Inspect wiper blades for tears and deterioration.

(2) Inspect all components for corrosion and serviceability.

e. Installation. (1) Position motor (19, figure 11-29) in motor mounting bracket (25) and position bracket behind instrument panel, with electrical receptacle on motor facing left-hand side of aircraft.

(2) Secure motor mounting bracket (25) and resistor (22) to aircraft with bolts (23) and washers (24). Secure the two upper bolts together and the two bottom bolts together with lock wire.

(3) Connect ground wire (21) to fuselage.

(4) Connect electrical connector (20) to motor (19).

(5) Secure converter (15) to converter mounting bracket (12) with screws (17) and nuts (16).

NOTE

If the right-hand converter is being replaced with a new one, the new converter must be adjusted to the full left-hand blade position. This operation can most easily be done before the converter is installed, using one of the flexible drives.

(6) Secure converter mounting bracket (12), with converter (15) attached, to airframe with bolts (13) and washers (14).

(7) Connect flexible drive assembly (18) to converter (15) and motor (19). Secure each end of drive assembly with lock wire.

(8) Apply sealant (item 51, table 1-8) around converter shafts, where they protrude through fuselage skin, to form a seal between shafts and link weld assembly.

(9) Slip link weld assembly (11) over converter shaft and secure to fuselage with screws (10).

(10) Attach wiper blade (5) to wiper blade arm (3).

(11) Attach wiper blade assembly (4) to wiper arm (7).

(12) Connect wiper arm (7) to link arm (6) with pin (2) and cotter pin (1).

(13) Position wiper arm (7) and link arm (6) on link weld assembly (11) and secure with nuts (8) and washers (9).

SECTION IX AUXILIARY POWER UNIT

Not Applicable

SECTION X VACUUM SYSTEM

11-167. DESCRIPTION.

11-168. The vacuum system (figures 11-30 and 11-31) consists of a vacuum pump, oil separator, suction relief valve, check valves, aircraft instrument filter, vacuum selector valve, suction gage, and an attitude indicator (standby). The vacuum pump provides vacuum for operation of deicer system and attitude indicator (standby). Oil required for lubrication of the vacuum pump is reclaimed and sent back to the engine by an oil separator. Check valves are installed in the system to seal off a vacuum pump should it fail. A suction relief valve is provided in the inlet line of each vacuum pump to regulate the vacuum to approximately 4

inches Hg. Vacuum air is drawn through the aircraft instrument filter, located behind the instrument panel. The vacuum selector valve, suction gage, and attitude indicator (standby) are located on the instrument panel.

NOTE

There is no vacuum selector valve on the U-8F aircraft.

Troubleshooting consists of locating and correcting failure, leakage, or unsatisfactory operation of the vacuum system. The following procedures list the most common troubles, probable causes, and possible remedies.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Low suction gage reading	Suction relief valve not properly adjusted	Adjust suction relief valve. (Refer to paragraph 11-91 or 11-92.)
	Defective vacuum pump	Replace defective vacuum pump. (Refer to paragraph 11-89.)
	Insufficient lubrication of vacuum pump	Remove vacuum pump and check lubrication port for restriction.
	Leak or break in suction line	Locate leak. Tighten connections or replace line.
	Defective suction gage	Replace suction gage. (Refer to paragraph 11-181.)
	Defective suction relief valve	Replace suction relief valve. (Refer to paragraph 11-91 or 11-92.)
High suction gage reading	Oil separator clogged or defective	Replace oil separator. (Refer to paragraph 11-90.)
	Suction relief valve not properly adjusted	Adjust suction relief valve. (Refer to paragraph 11-91 or 11-92.)
	Defective suction relief valve	Replace suction relief valve. (Refer to paragraph 11-91 or 11-92.)
	Defective suction gage	Replace suction gage. (Refer to paragraph 11-181.)
Suction gage inoperative	Suction relief valve screen clogged	Clean suction relief valve screen. (Refer to paragraph 11-91 or 11-92.)
	Clogged vacuum lines	Clean vacuum lines. (Refer to paragraph 11-185.)
	Shaft on vacuum pump broken	Replace vacuum pump. (Refer to paragraph 11-89.)
Vacuum operated instruments sluggish or inoperative but vacuum gage indicates normal suction	Clogged filter element	Clean filter element. (Refer to paragraph 11-177.)

11-169. VACUUM PUMP.

11-170. The vacuum pump (5, figure 11-30 or 11-31) is mounted on the right-hand side of each engine accessory section to provide vacuum

pressure for the deicer system and vacuum operated instruments. In the event a vacuum pump fails the other vacuum pump is capable of operating the vacuum system. Refer to paragraph 11-89 for description and maintenance instructions.

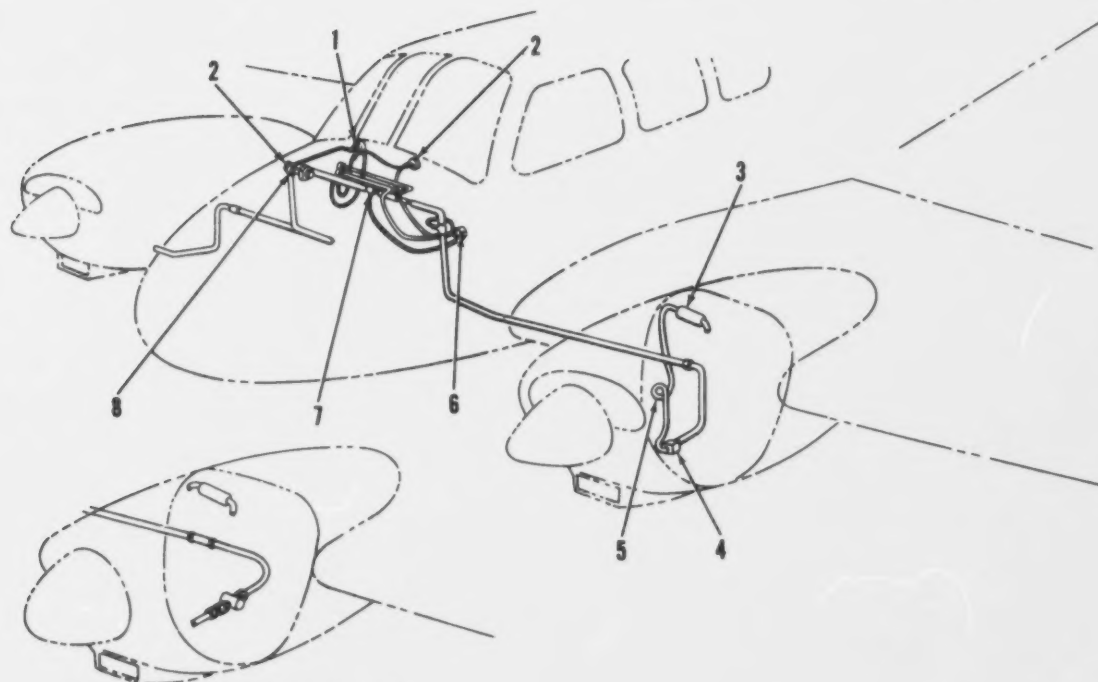
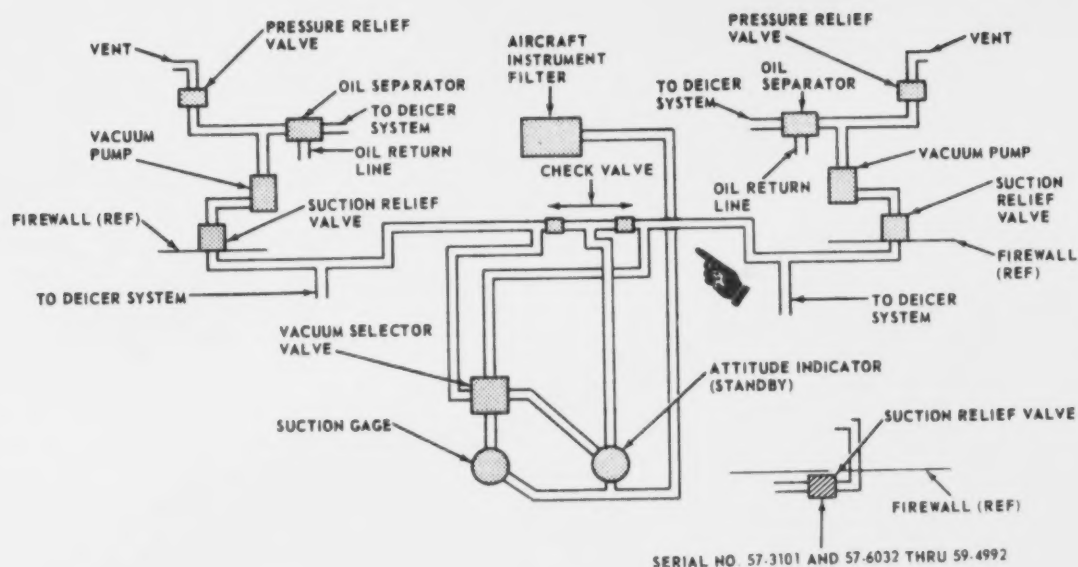
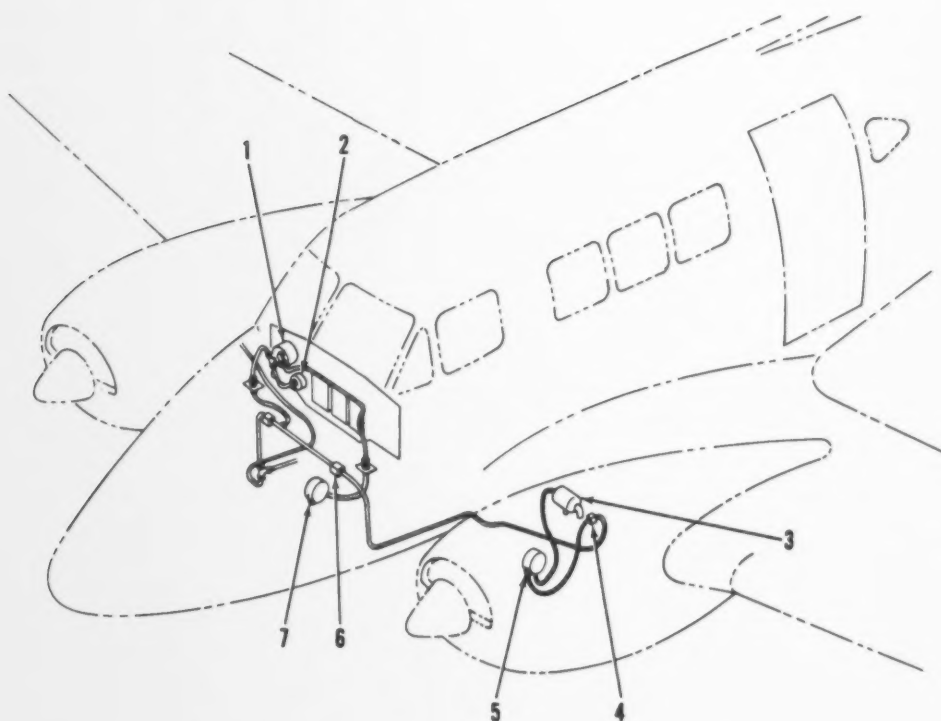
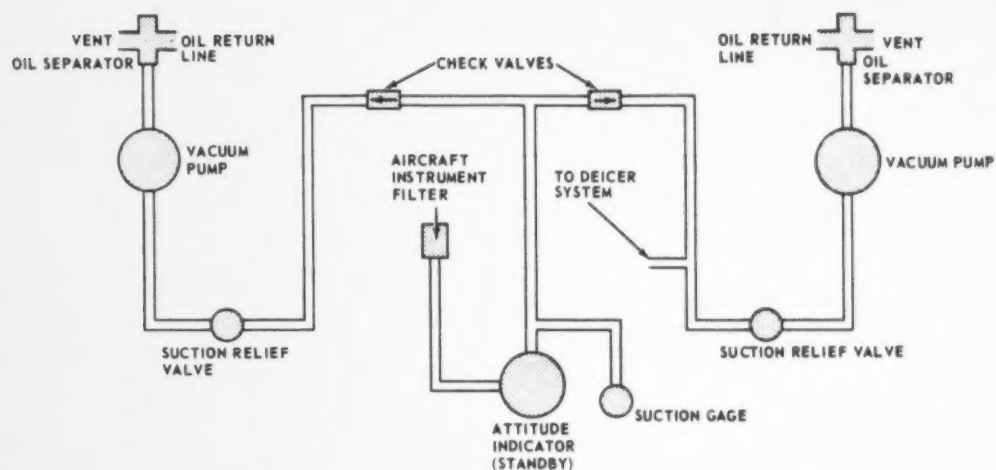


Figure 11-30. Vacuum system (U-8D, U-8G, and RU-8D)



1. Altitude indicator (Standby)
2. Suction gage
3. Oil separator
4. Suction relief valve

5. Vacuum pump
6. Check valve
7. Aircraft instrument filter

Figure 11-31. Vacuum system (U-8F)

11-171. OIL SEPARATOR.

11-172. The oil separator (3, figure 11-30 or 11-31) is an oval shaped assembly lined with baffles, located on the upper side of the fire-wall. As air passes through the oil separator, oil in the air collects on the baffles and drains to the bottom of the oil separator to be returned to the engine. Refer to paragraph 11-90 for description and maintenance instructions.

11-173. SUCTION RELIEF VALVE.

11-174. The suction relief valve (4, figures 11-30 and 11-31) is installed in the vacuum system to provide a means to regulate vacuum. As vacuum builds up with increasing engine rpm, the suction relief valve allows air to enter the vacuum pump inlet line and prevents vacuum from exceeding operating limits. Refer to paragraphs 11-91 and 11-92 for description and maintenance instructions.

11-175. CHECK VALVES.

11-176. A check valve (7, figure 11-30 or 6, figure 11-31) installed in the line from each vacuum pump permits air to move only from the attitude indicator (standby) to the vacuum pump. If one vacuum pump fails, its check valve will close, preventing operating vacuum pump from drawing air through inoperative vacuum pump. The check valves are located in back of the instrument panel, one on each side of the tee fittings connecting the vacuum pump lines to the attitude indicator (standby) line.

a. Removal. (1) Working behind instrument panel, disconnect check valves from tube assemblies.

(2) Cap and plug all open fittings.

b. Cleaning. (1) Clean check valves with dry cleaning solvent (item 6, table 1-8).

(2) Dry valves with compressed air.

c. Inspection. (1) Inspect check valves for cracks and corrosion.

(2) Inspect valves for damaged threads.

d. Installation. (1) Remove caps and plugs.

(2) Connect tube assemblies to check valves.

11-177. AIRCRAFT INSTRUMENT FILTER.

11-178. Air for operation of the attitude indicator (standby) passes through the aircraft

instrument filter (8, figure 11-30 or 7, figure 11-31) before entering the attitude indicator. The aircraft instrument filter removes dust, grit, and other foreign particles from the air to ensure long life and trouble-free operation of the attitude indicator. The aircraft instrument filter is located to the right and behind the instrument panel.

a. Removal. (1) Working behind instrument panel, disconnect hose or tube assembly from aircraft instrument filter.

(2) Remove bolts, washers, and nuts securing aircraft instrument filter to aircraft. Remove filter.

b. Cleaning. (1) Remove filter bowl from aircraft instrument filter.

(2) Clean inlet screen with dry cleaning solvent (item 6, table 1-8). Dry with filtered, compressed air.

(3) Clean filter element by blowing air through filter element in direction opposite to normal airflow. Direct air at an angle of approximately 45 degrees to walls of filter element to prevent clogging filter element with dust.

(4) Install filter bowl to aircraft instrument filter.

NOTE

Filter element and inlet screen should be cleaned at each periodic inspection. Under severe dusty conditions, it may be necessary to clean filter element more often.

c. Inspection. (1) Inspect instrument filter for cracks and corrosion.

(2) Inspect screen and filter element for dirt and servicability. Replace if damaged.

d. Installation. (1) Position aircraft instrument filter and secure with bolts, washers, and nuts.

(2) Connect hose or tube assembly to aircraft instrument filter.

11-179. VACUUM SELECTOR VALVE. (U-8D, U-8G, RU-8D)

11-180. The vacuum selector valve (6, figure 11-30) has three positions, LEFT, RIGHT, and NORMAL. When the handle is selected to LEFT or RIGHT positions, the vacuum selector valve connects either left or right vacuum pump to the suction gage, providing a reading for that vacuum pump only. When the NORMAL position is selected, the vacuum selector valve connects the suction gage to the entire system. The vacuum selector valve is located on the left subpanel.

a. Removal. (1) Disconnect hose and tube assemblies from vacuum selector valve (6, figure 11-30). Cap open fittings.

(2) Remove handle from vacuum selector valve.

(3) Remove screws securing vacuum selector valve to left subpanel. Remove valve.

b. Cleaning. (1) Wipe valve with clean cloth dampened with dry cleaning solvent (item 6, table 1-8).

(2) Dry valve with compressed air.

c. Inspection. (1) Inspect valve for cracks and corruptions.

(2) Inspect valve for damaged threads.

d. Installation. (1) Position vacuum selector valve against forward side of left subpanel.

(2) Install screws securing vacuum selector valve to left subpanel.

(3) Install handle on vacuum selector valve.

(4) Remove caps and connect hose and tube assemblies to vacuum selector valve.

11-181. SUCTION GAGE.

11-182. The suction gage indicates suction, in inches of mercury, in the vacuum system. The suction gage on the U-8D, U-8G, and RU-8D aircraft is located on the left instrument panel below the radio compass. On the U-8F aircraft, the suction gage is located on a panel on the right hand side of the copilot. Refer to paragraph 10-51 for description and maintenance instructions.

11-183. ATTITUDE INDICATOR (STANDBY).

11-184. The attitude indicator (standby) (1, figures 11-30 or 11-31) is a vacuum operated instrument serving the same purpose as the electrically operated attitude indicator (primary). The movable horizon bar and the aircraft symbol are adjusted in the same manner as on the primary attitude indicator. The standby attitude indicator is located in the center of the instrument panel on the right side. Refer to paragraph 10-23 for description and maintenance instructions.

11-185. VACUUM SYSTEM TUBE AND HOSE ASSEMBLIES.

11-186. The vacuum system tubes and hose assemblies (figures 11-30 and 11-31) are interconnected with the deicing system. Tube and hose assemblies connected to the vacuum pumps,

oil separators, and suction relief valves are removed and installed in paragraph 11-93a and d.

a. Removal. (1) Working from behind the instrument panel (U-8D, U-8G, and RU-8D), disconnect and remove tube and hose assemblies between vacuum selector valve (6, figure 11-30) and suction relief valves (4) at engine firewalls.

NOTE

Cap all open fittings and ports. During removal, rotate coupling nut of tubing or hose assembly with one wrench while holding fitting to which it is secured with another wrench.

(2) Disconnect tube and hose assemblies from vacuum selector valve (6), suction gage (2), and attitude indicator (standby) (1).

(3) Disconnect and remove hose assemblies from aircraft instrument air filter (8), attitude indicator (standby) (1), and suction gage (2).

(4) Disconnect and remove tube assembly from attitude indicator (standby) (1) and tee fitting in tube assembly line to check valves (7).

(5) Disconnect and remove tube assembly between check valves (7).

b. Removal. (1) Working from behind the instrument panel (U-8F), disconnect and remove tube assemblies between check valves (6, figure 11-31) and suction relief valves (4). Disconnect and remove tube assemblies and tee fitting between check valves (6).

NOTE

Cap all open fittings and ports. During removal, rotate coupling nut of tubing or hose assembly with one wrench while holding fitting to which it is secured with another wrench.

(2) Disconnect and remove hose assemblies between attitude indicator (standby) (1), suction gage (2), and aircraft instrument filter (7).

c. Cleaning. (1) Flush tube and hose assemblies with dry cleaning solvent (item 6, table 1-8).

(2) Dry tube and hose assemblies with compressed air.

d. Inspection. (1) Inspect tube assemblies for cracks, dents, and corrosion.

(2) Inspect hose assemblies for cuts and chafing.

(3) Inspect fittings for damaged threads.

(4) Inspect clamps for torn rubber and elongated holes.

e. Installation. (1) Route tube assemblies (U-8D, U-8G, and RU-8D) between check valves (7, figure 11-30). Connect tube assemblies to check valves and tee fitting.

NOTE

Remove caps and plugs. During installation rotate coupling nut of tubing or hose assembly with one wrench while holding fitting to which it is secured with another wrench.

(2) Route and connect tube and hose assemblies between vacuum selector valve (6) and suction relief valves (4). Connect to valves (4 and 6).

(3) Route tube assembly between attitude indicator (standby) (1) and tee fitting. Connect tube assembly to tee fitting and indicator.

(4) Route hose assemblies between aircraft instrument air filter (8), attitude indicator (standby) (1), and suction gage (2). Connect hose assemblies to components.

(5) Route tube and hose assemblies between vacuum selector valve (6), suction gage (2), and attitude indicator (standby) (1). Connect tube and hose assemblies to components.

(6) Install all clamps that were removed.

f. Installation. (1) Route and connect tube assemblies (U-8F) and tee fitting to check valve (6, figure 11-31).

NOTE

Remove caps and plugs. During installation, rotate coupling nut of tubing or hose assembly with one wrench while holding fitting to which it is secured with another wrench.

(2) Route and connect hose assemblies to attitude indicator (standby) (1), tee fittings, suction gage (2), and aircraft instrument filter (7). Install clamps.

CHAPTER 12

ELECTRICAL SYSTEMS

SECTION I SCOPE

12-1. PURPOSE.

12-2. The purpose of this chapter is to provide all of the essential information for maintenance personnel to accomplish organizational maintenance on the complete electrical systems. It includes a general description and the function of each system.

12-3. DESCRIPTION.

12-4. U-8 aircraft are equipped with a 28-volt direct current electrical system and 115-volt single and three phase 400-cycle alternating current systems. (See figures 12-1, 12-1A, 12-2, 12-3, 12-4, and 12-4A). The primary sources of dc power are the generators and battery. The inverters supply the aircraft with ac power. Receptacles are provided to connect the aircraft to auxiliary electrical power. The dc and single phase ac circuits are single-wire with a common ground return through the aircraft structure. Phase B of the three phase ac system is grounded in the same manner. U-8 (ASAC) aircraft are equipped with single-phase AC systems.

12-5. WIRE IDENTIFICATION.

12-6. Each electrical wire in the aircraft is identified by a letter-number code stamped or taped to wire, and this code is reflected throughout the wiring diagrams. The code identifies the circuit function and includes the wire number, segment, and size respectively.

12-7. ELECTRICAL CONNECTORS.

12-8. Many of the removable aircraft electrical

components such as control panels and instruments are connected electrically through disconnect plugs and receptacles. In addition, electrical connectors are provided at firewalls, bulkheads and decks. The electrical connectors are provided for ease in removal and installation of components.

a. Removal. (1) Place battery and generator master switches in OFF position. Open battery compartment and disconnect battery. Make sure external power source is disconnected.

(2) Disconnect electrical connector to be removed at mating plug or receptacle.

(3) Disassemble electrical connector to expose pin terminals.

(4) Slide insulated sleeves back over wires and disconnect wires. Remove electrical connector from aircraft.

NOTE

Tag and identify electrical wires to aid in installation.

b. Inspection. (1) Inspect terminals for corrosion or indications of arcing.

(2) Inspect sleeves and shells for stripped threads.

(3) Inspect connecting wiring for fraying and kinks.

c. Installation. (1) Place battery and generator master switches in OFF position. Open battery compartment and disconnect battery. Make sure external power source is disconnected.

(2) Remove identifying tags and connect electrical wires to electrical connectors. Slide insulated sleeves back over connections.

(3) Reassemble electrical connector and check each pin for shorts to ground (aircraft structure).

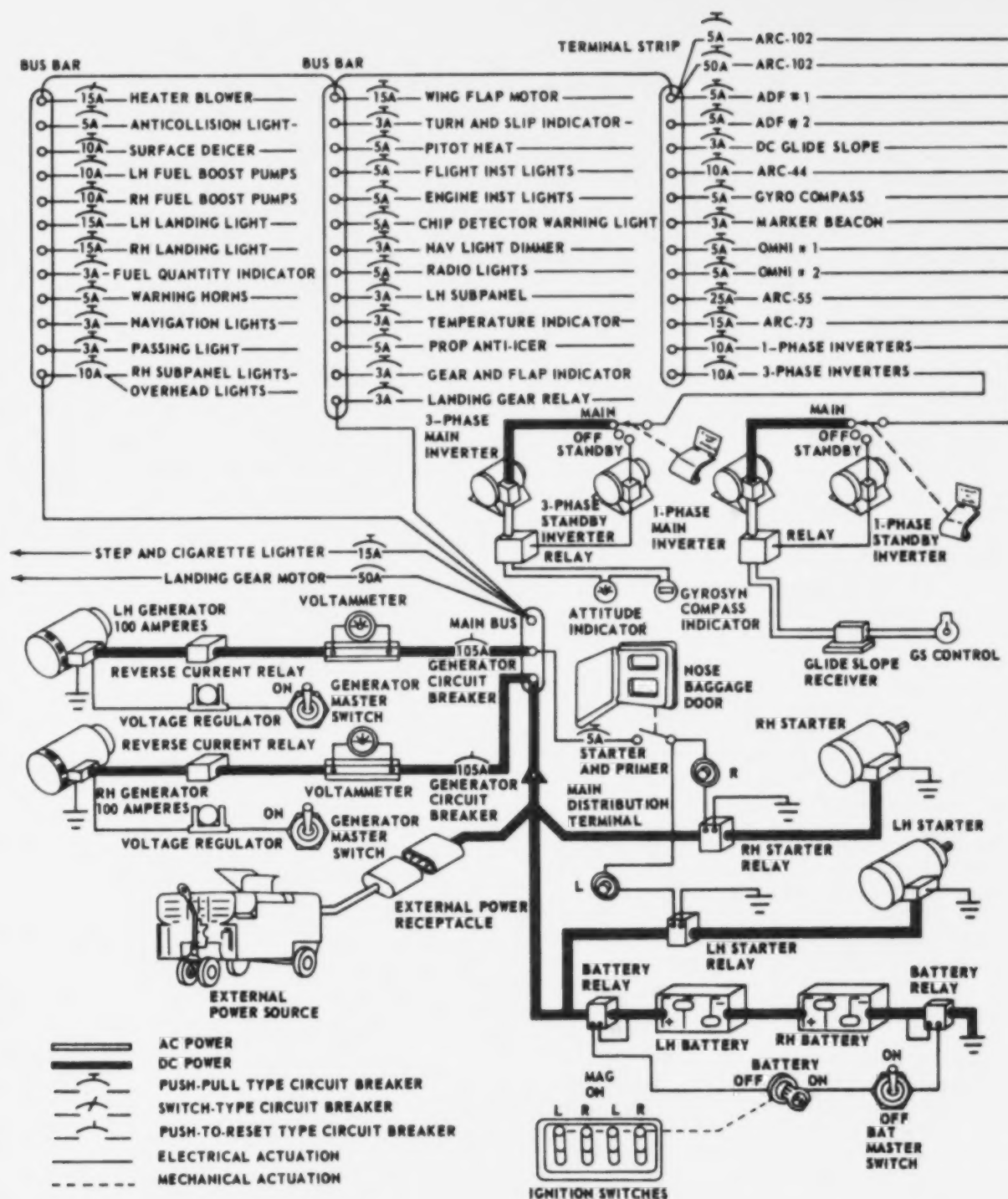


Figure 12-1. Electrical system schematic (U-8D)

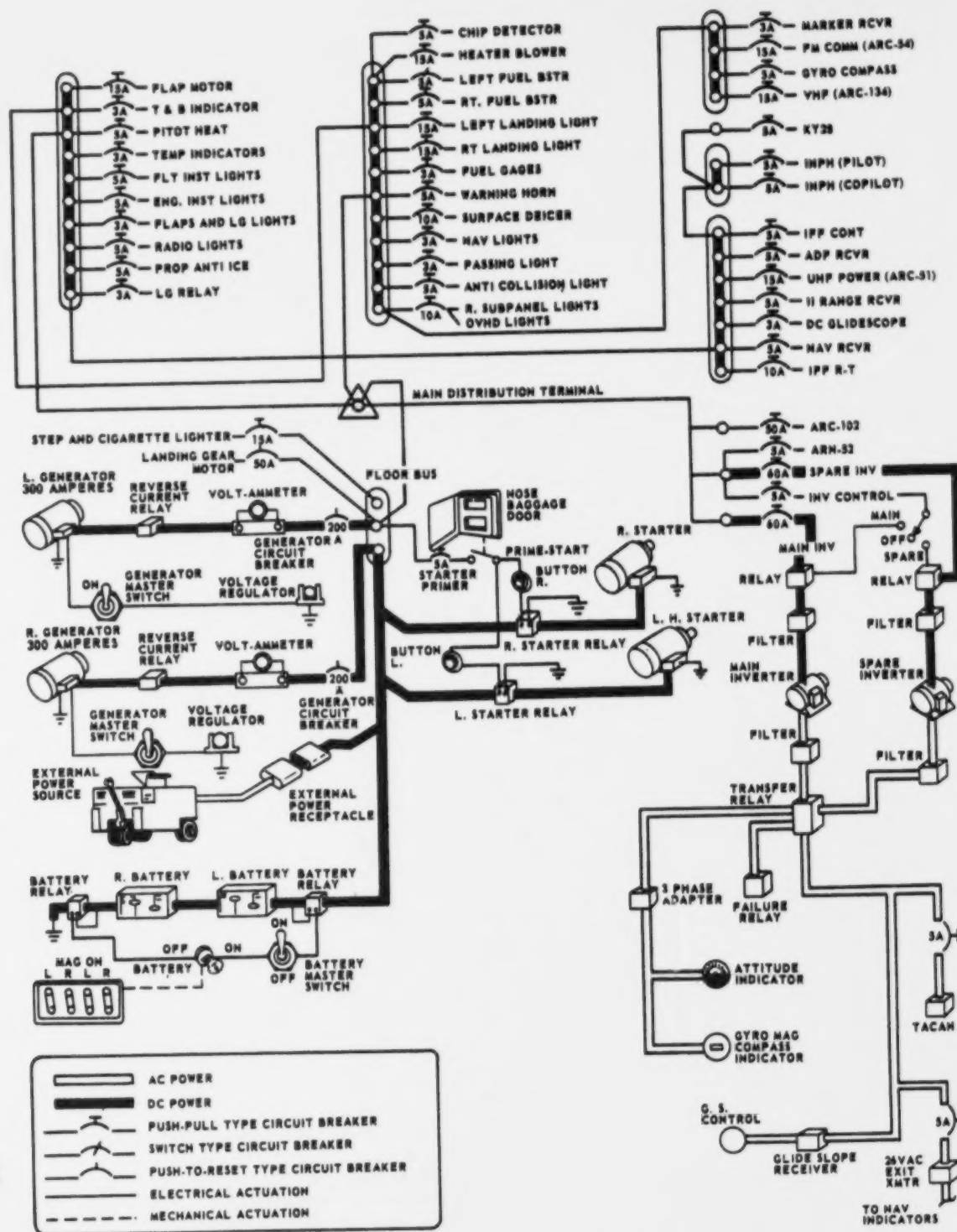


Figure 12-1A. Electrical system schematic (U-8D ASAC)

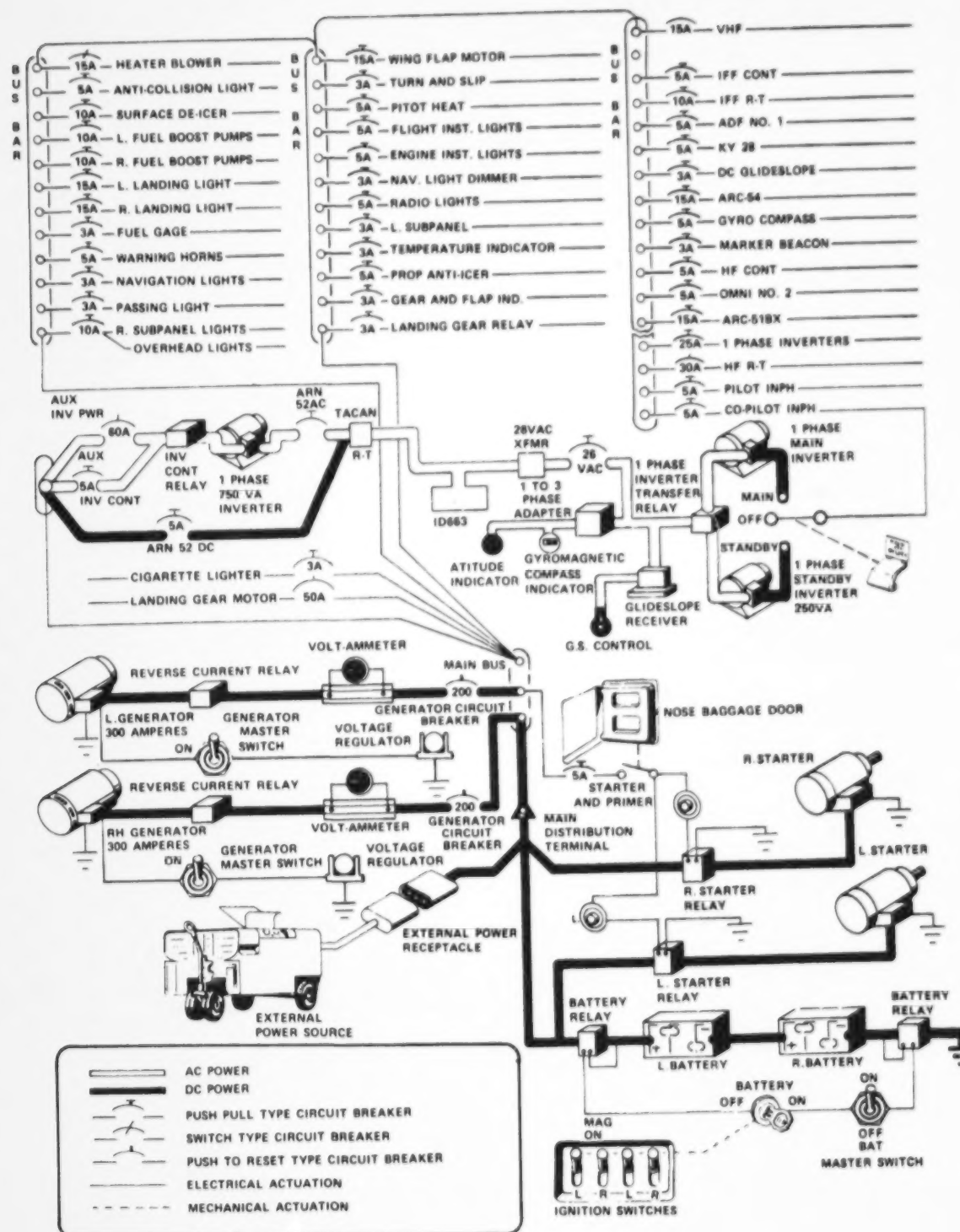


Figure 12-2. Electrical system schematic (U-8G)

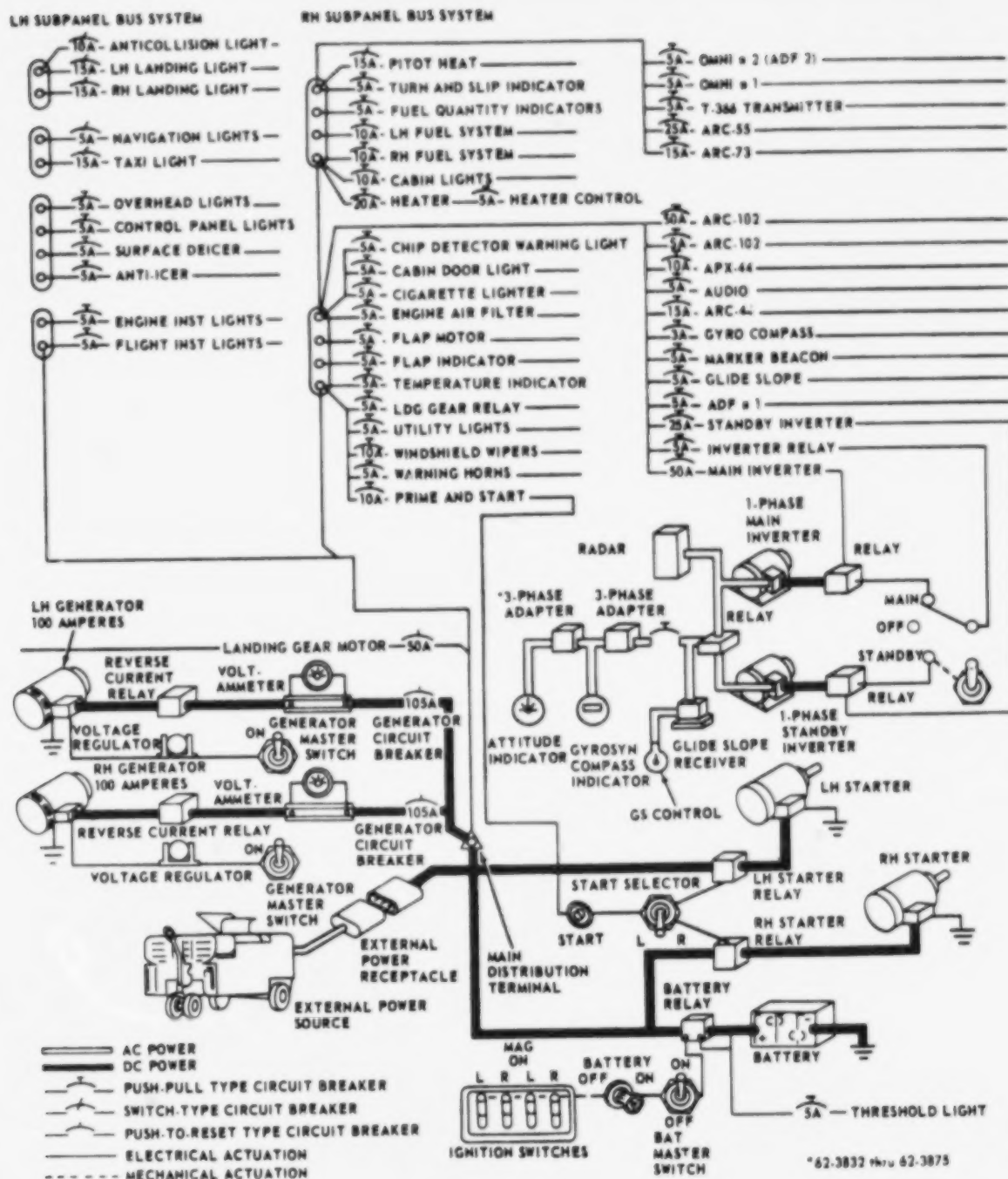


Figure 12-4. Electrical system schematic (U-8F) (sheet 1 of 2)

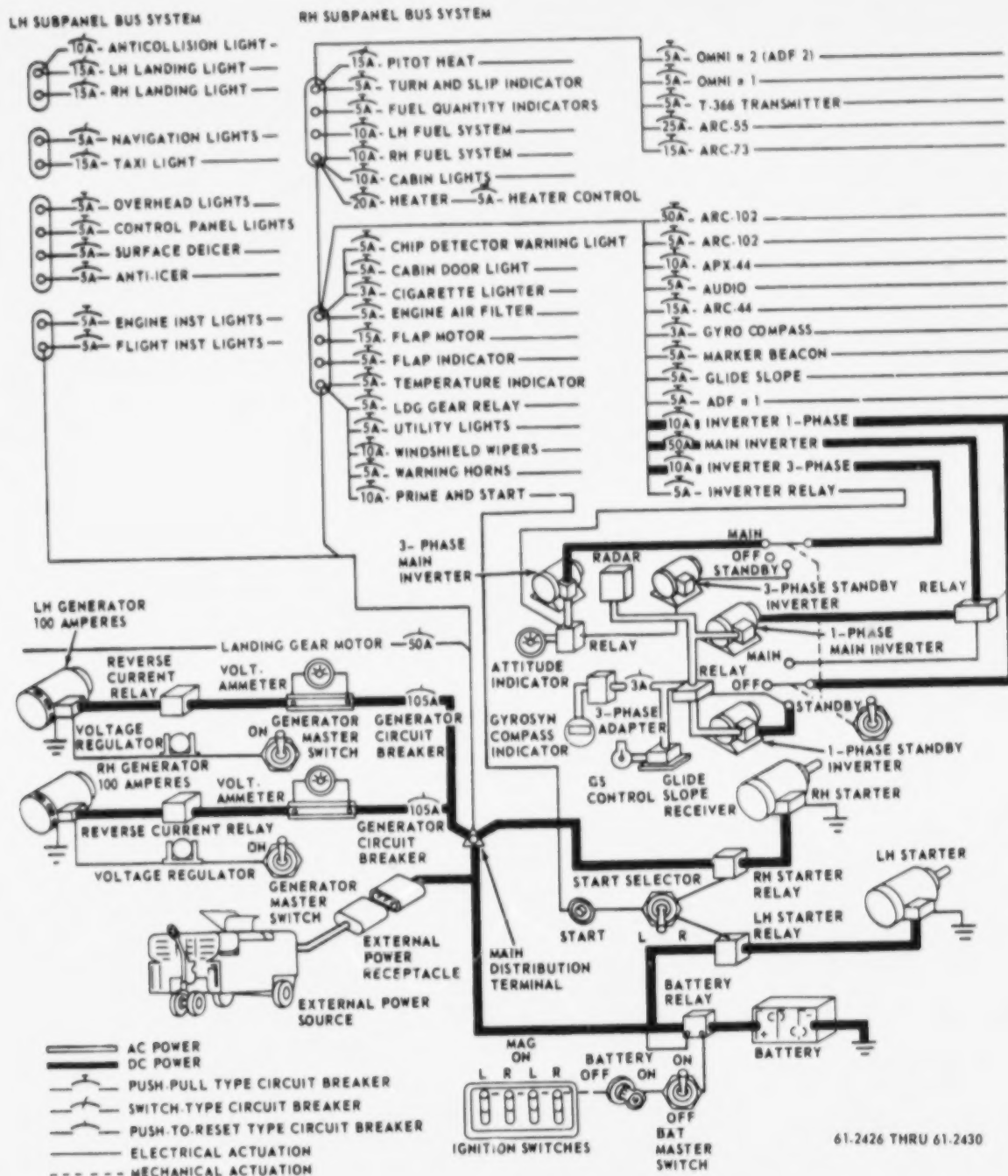


Figure 12-4. Electrical system schematic (U-8F) (sheet 2 of 2)

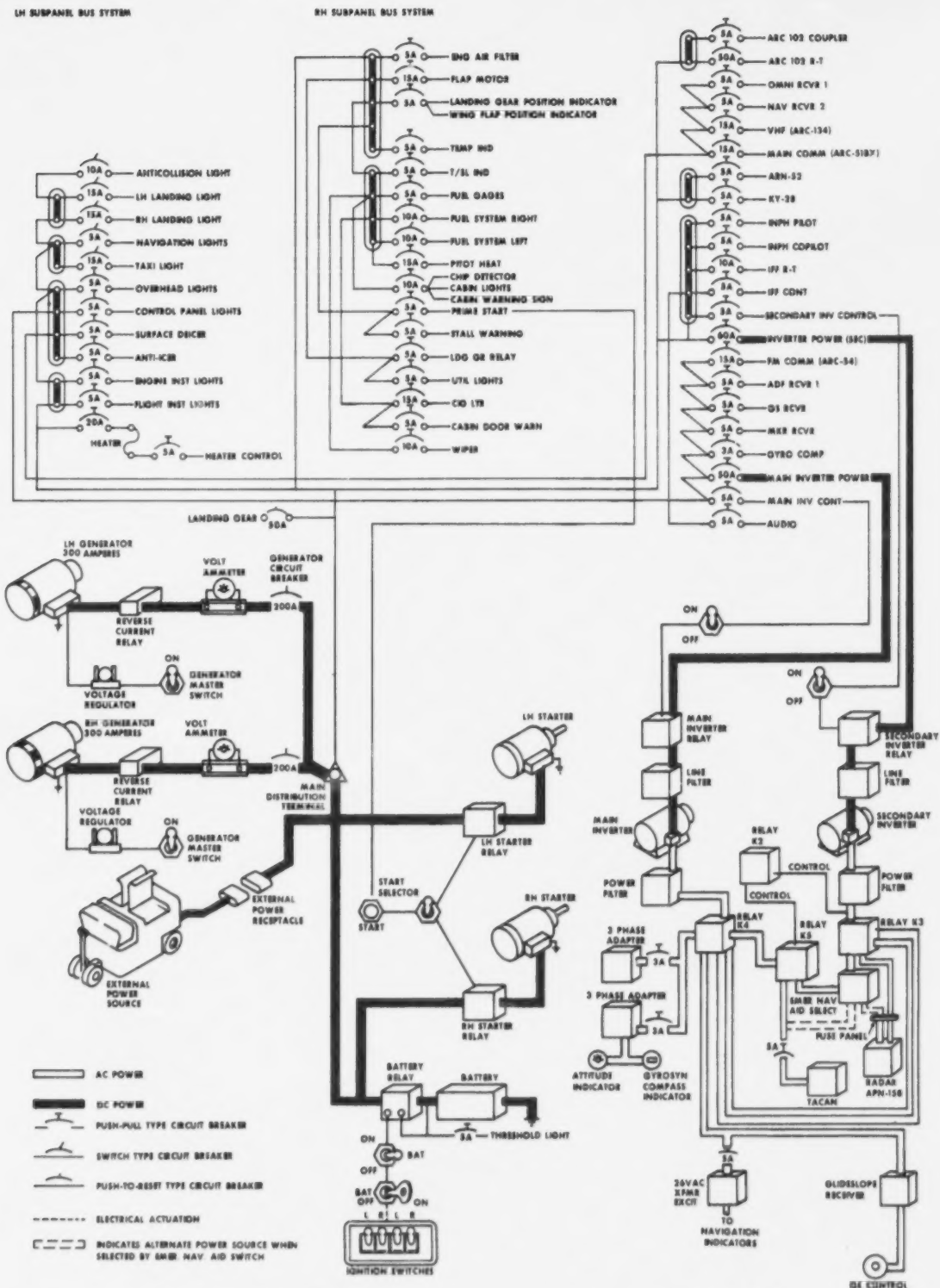


Figure 12-4A. Electrical system schematic (U-8F ASAC)

(4) Connect electrical connector to mating plug or receptacle. Secure with lockwire if required. (Refer to paragraph 12-9.)

12-9. LOCKWIRING OF ELECTRICAL CONNECTORS.

12-10. All electrical connectors (except quick disconnect types) in the engine compartment and other areas of high vibration (except those on

shock mounted equipment), and in areas not accessible for periodic inspection, must have the coupling nut secured with lockwire or otherwise mechanically locked to prevent opening of the connector due to vibration.

12-11. SOLDERED CONNECTIONS.

12-12. For all soldering operations, use solder (item 80, table 1-8).

SECTION II DIRECT CURRENT POWER DISTRIBUTION SYSTEM

12-13. DESCRIPTION.

12-14. Filtered direct current for operating the various units of electrical and electronic equip-

ment is supplied by the generator, the battery, or by an external power supply.

a. Troubleshooting. For troubleshooting procedures for the direct current system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No indication of power with BATTERY MASTER switch in ON POSITION.	BATTERY LOCK switch on subpanel in OFF position.	Place BATTERY LOCK switch in ON position.
	Defective component in battery circuit from battery to BATTERY MASTER switch.	Refer to applicable wiring diagram and perform a continuity check. Repair or replace defective component.
	Defective ground cable or poor connection.	Replace ground cable if defective. Clean and secure all connections at ground cable.
	BATTERY MASTER switch defective.	Replace BATTERY MASTER switch. (Refer to paragraph 12-17.)
	Defective battery relay.	Replace battery relay. (Refer to paragraph 12-171.)
Battery will not hold charge.	Charging rate too low.	Increase charging rate to proper value. (Refer to paragraph 12-189.)
	Level of electrolyte too low.	Keep level of electrolyte 3/8 inch above plates. (Refer to paragraph 12-167.)
	Sulphation (due to habitual undercharging.)	Replace battery. (Refer to paragraph 12-167 or 12-177.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Excessive loss of electrolyte.	Impurities in electrolyte frothing at vent.	Replace battery. (Refer to paragraph 12-167 or 12-177.)
	Broken cell partitions.	Replace battery. (Refer to paragraph 12-167 or 12-177.)
	Battery idle too long in hot climate.	Replace battery. (Refer to paragraph 12-167 or 12-177.)
	Battery improperly stored before use.	Replace battery. (Refer to paragraph 12-167 or 12-177.)
	Charging rate too high.	Reduce charging rate. (Refer to paragraph 12-218.)
	If loss in individual cell (or cells) only, cell (or cells) faulty.	Replace battery. (Refer to paragraph 12-167 or 12-177.)
Excessive corrosion on battery terminals.	Cracked case.	Replace battery. (Refer to paragraph 12-167 or 12-177.)
	Charging rate too high.	Reduce charging rate. (Refer to paragraph 12-189.)
	Electrolyte spilling over.	Remove excess acid with syringe.
Battery electrolyte freezes.	Specific gravity too low.	Maintain correct specific gravity readings during freezing weather. (See paragraph 12-167 or 12-177.)
	Battery discharged.	Replace battery. (Refer to paragraph 12-167 or 12-177.)
Polarity reversed.	Battery connections reversed	Check wiring to battery receptacles. Reverse wiring.
Zero or low generator output.	Loose or wrong connection.	Check all wiring connections. (Refer to wiring diagrams, Chapter 13.)
	Defective generator.	Replace generator. (Refer to paragraph 12-187.)
	Defective reverse current relay.	Replace reverse current relay. (Refer to paragraph 12-191.)
	Defective voltage regulator	Replace voltage regulator. (Refer to paragraph 12-189.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
No generator current output.	Defective voltammeter.	Replace voltammeter. (Refer to paragraph 10-59.)
	Defective generator control switch.	Check and replace if defective.
	Defective circuit breaker.	Replace circuit breaker. (Refer to paragraph 12-193.)
	Open circuit.	Check circuit continuity.
	Defective reverse current relay.	Replace reverse current relay. (Refer to paragraph 12-191.)
	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)
	Defective generator.	Replace generator. (Refer to paragraph 12-187.)
One generator tends to carry most of the load (Both generators turned on)	Defective control switch.	Replace control switch. (Refer to paragraph 12-17.)
	Generators not paralleled.	Adjust voltage regulator and paralleling resistor as described in paragraph 12-189.
	Wiring-reversed at rear of voltammeter.	Reconnect properly.
	Loose connection on SW terminal of reverse current relay.	Tighten connection.
	Loose connection or ground in aircraft wiring.	Check wire connections.
	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)
	Defective generator brushes.	Replace generator. (Refer to paragraph 12-187.)
Excessive arcing is present at brushes.	Defective brushes or commutator.	Replace generator. (Refer to paragraph 12-187.)
	Voltage regulator out of adjustment.	Adjust voltage regulator. (Refer to paragraph 12-189.)
	Wrong connection between generator and switch relays.	Check and correct according to the wiring diagrams.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Generator voltage output fluctuates.	Short circuit.	Repair or replace defective components as required.
	Pitted commutator.	Replace generator. (Refer to paragraph 12-197.)
	Short circuit between A and B terminals on voltage regulator.	Replace voltage regulator as required. (Refer to paragraph 12-189.)
Generators will not parallel.	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)
	Defective generator brushes.	Replace generator. (Refer to paragraph 12-187.)
Generator voltage drops excessively when a load is applied.	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)
	External power source defective.	Obtain operative external power source.
External power fails to energize aircraft system.	Open circuit from external power relay to main bus.	Check circuit connections.
	GENERATOR switch in OFF position.	Place GENERATOR switch in ON position.
Generator produces voltage, but voltammeter reads 0.	Defective reverse current relay.	Check for higher voltage on GEN terminal than on BAT terminal of relay. Replace defective reverse current relay. (Refer to paragraph 12-191.)
	Defective voltammeter.	Check for continuity of wiring between loadmeter and loadmeter shunt. Repair wiring or replace defective voltammeter. (Refer to paragraph 10-59.)
	Voltage regulator not adjusted properly.	Check generator output; adjust voltage regulator. (Refer to paragraph 12-189.)
Generator voltage too high.	Defective rheostat in voltage regulator.	Check rheostat for smooth adjustment between 26 and 30 volts; replace defective voltage regulator. (Refer to paragraph 12-189.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Generator voltage too low.	Loose negative connection to voltage regulator.	Tighten connection.
	Defective voltammeter.	Check with external voltmeter; replace defective voltammeter. (Refer to paragraph 10-59.)
	Defective wiring between generator and voltage regulator.	Check continuity of wiring. Notify direct support maintenance unit of defect.
	Contact springs in base not making good contact with regulator prongs.	Clean springs and prongs on voltage regulator.
	Voltage regulator not adjusted properly.	Adjust voltage regulator. (Refer to paragraph 12-199.)
	Loose connections in generator field circuit.	Tighten connections.
	Contact springs in base not making good contact with regulator prongs.	Clean springs and prongs on voltage regulator.
Movement of regulator rheostat does not alter voltage.	Defective voltammeter.	Check generator output with external voltmeter. Replace voltammeter. (Refer to paragraph 10-59.)
	Defective rheostat in voltage regulator.	Replace defective voltage regulator. (Refer to paragraph 12-189.)
	Carbon pile out of adjustment or defective.	Replace voltage regulator. (Refer to paragraph 12-189.)
	Defective wiring between generator and voltage regulator.	Check continuity of wiring. Notify direct support maintenance unit.
Voltammeter fluctuates rapidly under steady load conditions.	Contact springs in base not making good contact with voltage regulator prongs.	Clean springs and prongs on voltage regulator.
	Voltage regulator unstable.	Replace voltage regulator. (Refer to paragraph 12-189.)
Voltage varies excessively with change in engine speed or electrical load.	Carbon pile out of adjustment or defective.	Replace voltage regulator. (Refer to paragraph 12-199.)

b. Maintenance operational check. The following check for system performance may also be referred to for maintenance operational check prior to removal or for function tests after the installation of equipment.

(1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Place switch on either utility light in ON position. Utility light should remain inoperative.

(3) Place battery master switch in ON position. Place key-operated battery switch in ON position. Utility light should come on.

(4) Place battery master switch in OFF position. Utility light should go off.

(5) Place battery switch in OFF position. Connect a source of external power to aircraft. Utility light should come on.

(6) Start and warm up engines in accordance with TM 55-1510-201-10. Place generator master switches in ON position.

(7) With engines operating above generator cut-in rpm, disconnect external power source. Utility light should remain on.

(8) Depress button for voltage reading at each voltmeter. Readings should be between 26.9 and 28.5 volts, and within 0.2 volt of each other.

(9) Switch on sufficient load to obtain clockwise movement on voltmeter amperage reading, signifying connection across dc shunts on main bus and proper operation of voltmeter. Load should be equal on generators.

CAUTION

Do not switch on landing light or pilot heater for load test purposes for more than 1 minute maximum, as lack of air flow could cause damage to component. Do not exceed rated load of one generator.

(10) Using generator master switches, alternately switch each generator out of the circuit. Associated voltmeter amperage reading should fall to 0 as generator is switched out of circuit alternate voltmeter amperage reading should double and return to former value in the same sequence.

(11) Remove load applied in step (9) above and shut down engines in accordance with TM 55-1510-201-10.

12-15. DC POWER DISTRIBUTION.

12-16. The dc power distribution within the aircraft is accomplished by a bus network consisting of the left-hand floorboard bus, and the left and right-hand subpanel bus bars in the U-8D, U-8G, and RU-8D aircraft; and of the left and right-hand panel and subpanel bus bars in the U-8F aircraft. Power is distributed to the buses in all aircraft from the main belly terminal post. In U-8F aircraft, the threshold light circuit breaker is connected directly to the battery bus and the light is operative at all times with a serviceable battery properly installed in the aircraft. All other electrical services are connected to the bus system beyond the battery relay. The bus system is powered by the generators during normal flight and the battery is charged if the battery and generator switches are ON. Should either generator fail, power will be supplied by the remaining generator and the battery for aircraft. As required, the battery and generators may be switched out of the power system by placing the individual battery or generator switch in the OFF position. When on the ground, external power may be applied to operate the aircraft systems by means of the external power receptacle, located on the outboard side of the left engine.

12-17. TOGGLE SWITCHES.

12-18. The U-8 aircraft are equipped with two- and three-position toggle switches used to control components in the various electrical systems. The toggle switches are located mainly on the instrument panel and subpanel, and the control console or pedestal. (See figures 12-5 and 12-6.)

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect electrical wiring at rear of toggle switch.

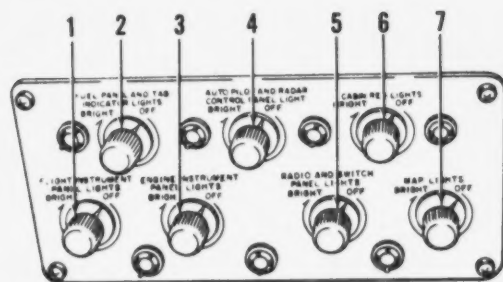
NOTE

On U-8F instrument subpanel, remove cover plates at rear to gain access to switch terminals.

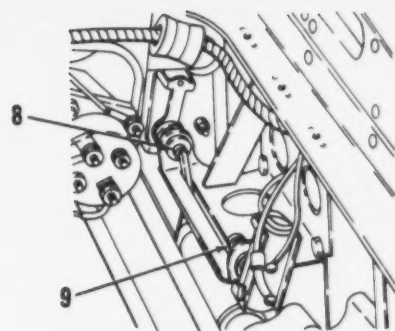
(3) At front of switch, remove retaining nut and lockwasher from shank of switch.

NOTE

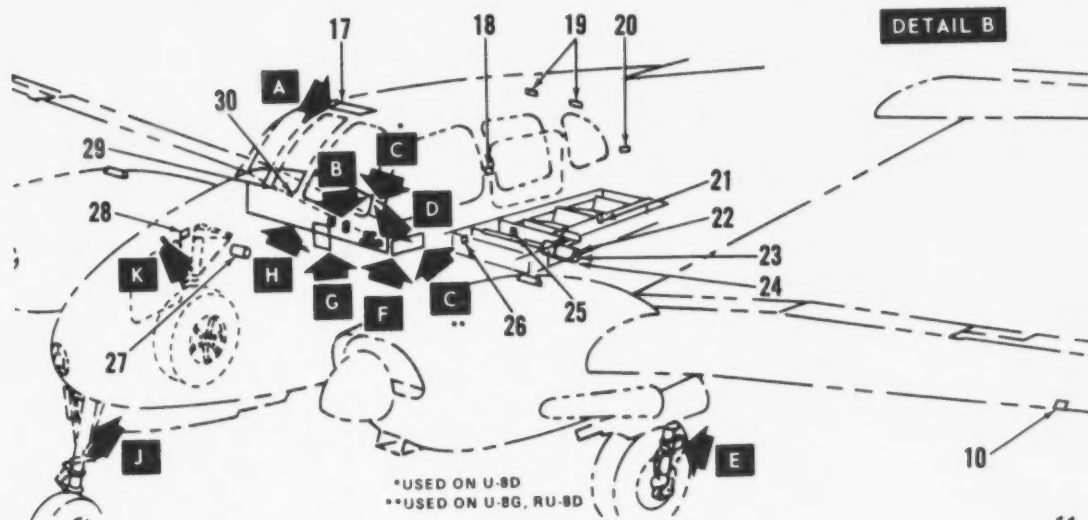
On U-8F instrument subpanel, remove edge light covers and bulbs, and remove control knobs. Remove edge-lighted panels to gain access to retaining nut and lockwasher.



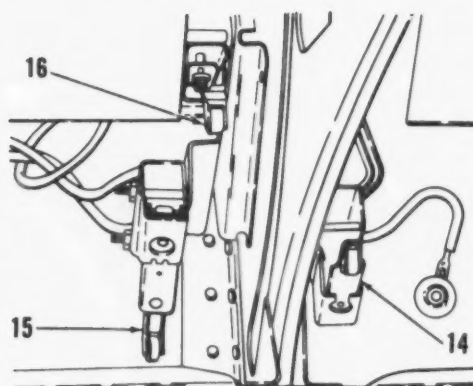
DETAIL A



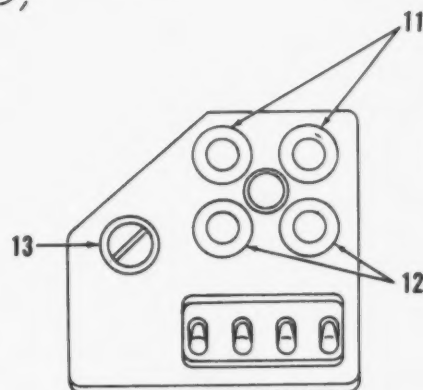
DETAIL B



*USED ON U-8D
**USED ON U-8G, RU-8D

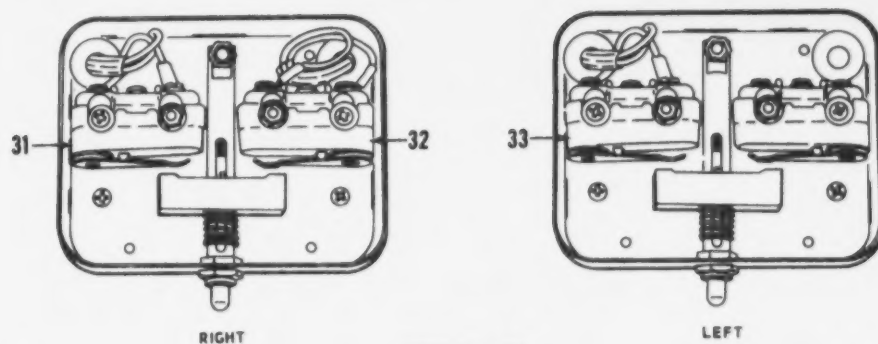


DETAIL D

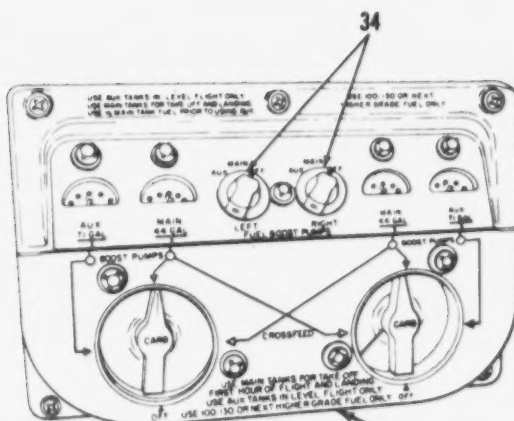


DETAIL C

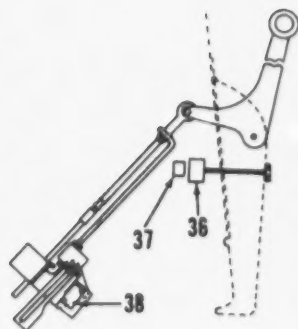
Figure 12-5. Switch locations (U-8D, U-8G, and RU-8D) (sheet 1 of 4)



DETAIL E



DETAIL F



DETAIL G

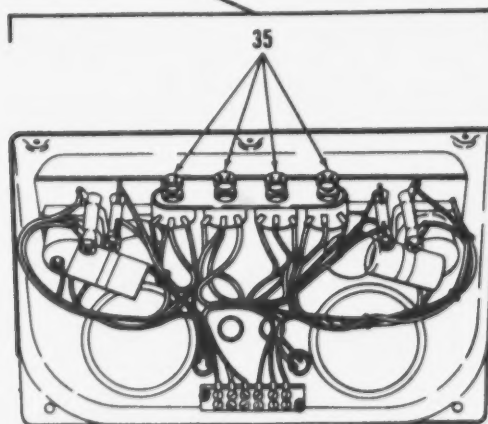
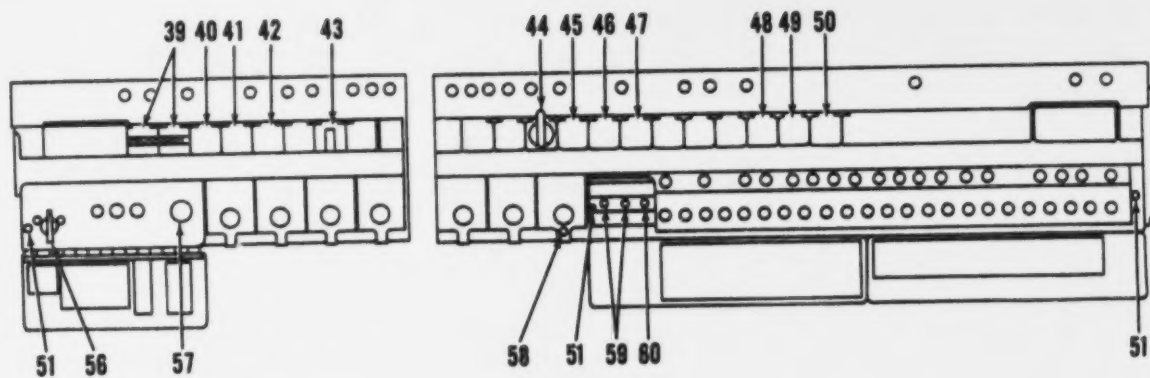
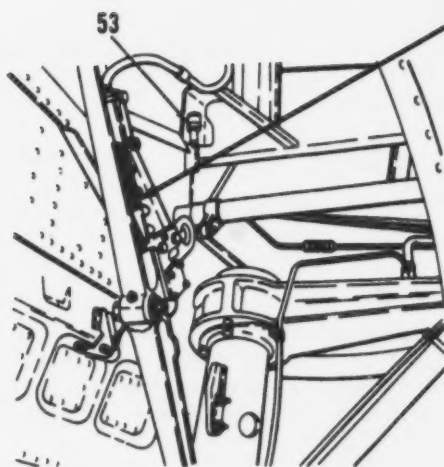
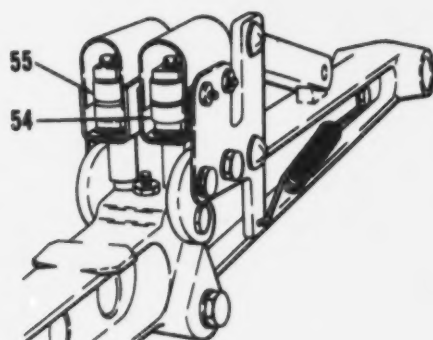


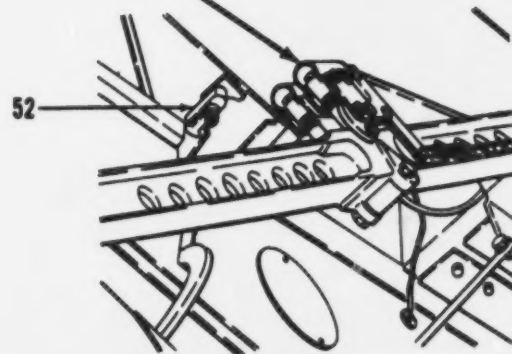
Figure 12-5. Switch locations (U-8D, U-8G, and RU-8D) (sheet 2 of 4)



DETAIL H



DETAIL K



DETAIL J

Figure 12-5. Switch locations (U-8D, U-8G, and RU-8D) (Sheet 3 of 4)

- | | | |
|--|--|--|
| 1. Flight instrument panel lights rheostat switch | 18. Rear baggage compartment light switch | 39. Landing light switches |
| 2. Fuel panel and tab indicator light rheostat switch | 19. Overhead reading light switches | 40. Passing light switch |
| 3. Engine instrument panel light rheostat switch | 20. Fuselage step key lock switch | 41. Pitot and stall warning heat switch |
| 4. Autopilot and radar control panel light rheostat switch | 21. Fuselage step limit switch (up) | 42. Navigation lights switch |
| 5. Radio and switch panel light rheostat switch | 22. Fuselage step limit switch (down) | 43. Wing flap position switch |
| 6. Cabin red lights rheostat switch | 23. Fuselage step limit switch (in) | 44. Landing gear position switch |
| 7. Map light rheostat switch | 24. Fuselage step safety switch (up) | 45. Surface deicing switch |
| 8. Landing gear up limit switch | 25. Fuselage step limit switch (out) | 46. Anticollision light switch |
| 9. Landing gear down limit switch | 26. Fuselage step limit switch (warning light) | 47. Navigation lights flasher switch |
| 10. Staff warning switch | 27. Fuel pressure switch | 48. Attitude indicator control switch |
| 11. Starter switches | 28. Starter safety switch | 49. Inverter switch (1-phase) |
| 12. Primer switches | 29. Landing gear bulb tester switch | 50. Inverter switch (3-phase) - not used U-8D (ASAC) |
| 13. Battery lock switch | 30. Warning horn silencer switch | 51. Circuit breaker panel light switch |
| 14. Wing flap 20 degree switch | 31. Fuselage step safety switch | 52. Nose landing gear up lock switch |
| 15. Wing flap up limit switch | 32. Landing gear safety switch | 53. Main landing gear up lock switch |
| 16. Wing flap down limit switch | 33. Landing gear warning switch | 54. Landing gear down lock switch |
| 17. Cabin step light switch | 34. Fuel boost pump switches | 55. Landing gear warning switch |
| | 35. Fuel quantity indicator adjust rheostats | 56. Suction gage selector switch |
| | 36. Temperature control rheostat | 57. Propeller anti-icing rheostat switch |
| | 37. Heater switch | 58. Heater and blower switch |
| | 38. Landing gear warning horn switch | 59. Generator master switches |
| | | 60. Battery master switch |

Figure 12-5. Switch locations (U-8D, U-8G, and RU-8D) (sheet 4 of 4)

(4) Remove switch from mounting hole.

b. Inspection. (1) Inspect terminals for security. Inspect terminal screws for malformed threads, corrosion, and damage.

(2) Inspect switch case for cracks and chipping.

(3) Inspect switch shank for distortion and malformed threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install toggle switch in mounting hole.

(3) Install lockwasher and retaining nut on shank of switch.

NOTE

On U-8F instrument subpanel, install edge-lighted panel, control knobs, bulbs, and light covers.

(4) Connect electrical wiring to proper terminals at rear of switch.

NOTE

On U-8F instrument subpanel, install cover plates at rear of subpanel.

12-19. ROTARY SWITCHES.

12-20. The rotary switches are used to provide a wide range of control for electrical system

components. The fuel boost pump, battery lock, and windshield wiper switches are examples of rotary switches. (See figures 12-5 and 12-6.)

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect electrical wiring at rear of rotary switch.

NOTE

On U-8F instrument subpanel, remove cover plates at rear to gain access to switch terminals.

(3) At front of switch, loosen setscrew and remove knob.

(4) Remove retaining nut and lockwasher from shank of switch.

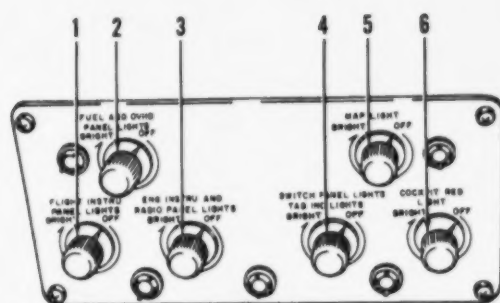
NOTE

On U-8F instrument subpanel, remove edge light covers and bulbs, and remove control knobs. Remove edge-lighted panels to gain access to retaining nut and lockwasher.

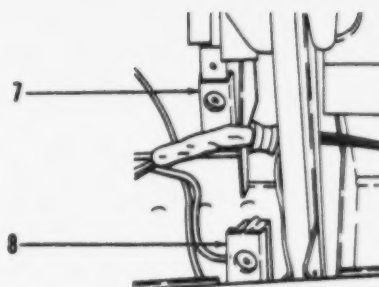
(5) Remove switch from mounting hole.

b. Inspection. (1) Inspect terminals for security. Inspect terminal screws for malformed threads, corrosion, and damage.

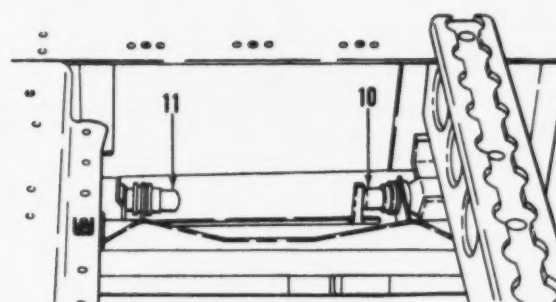
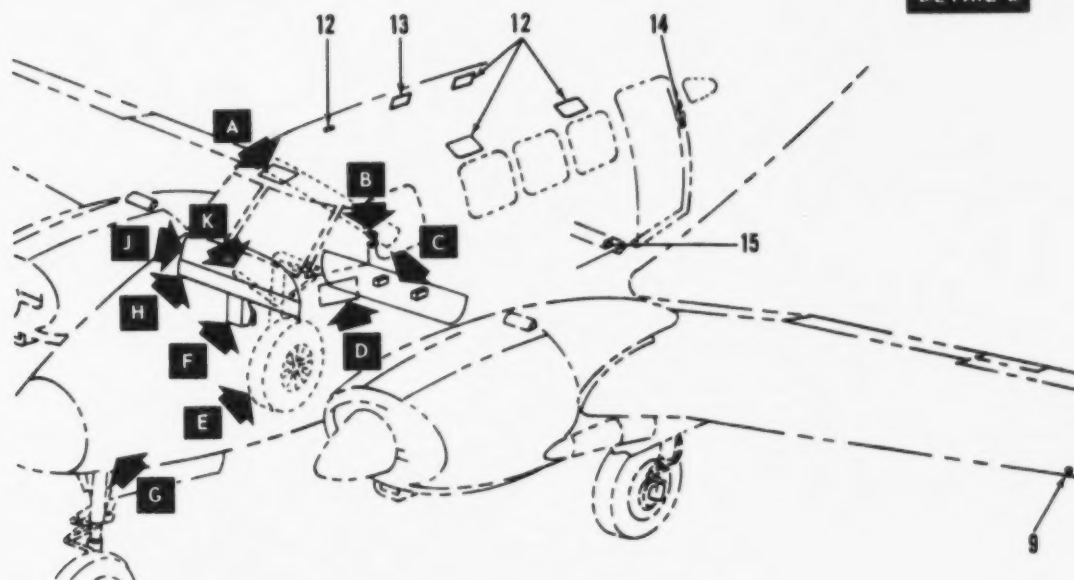
(2) Inspect switch case for cracks and chipping.



DETAIL A



DETAIL B



DETAIL C

Figure 12-6. Switch locations (U-8F) (sheet 1 of 4)

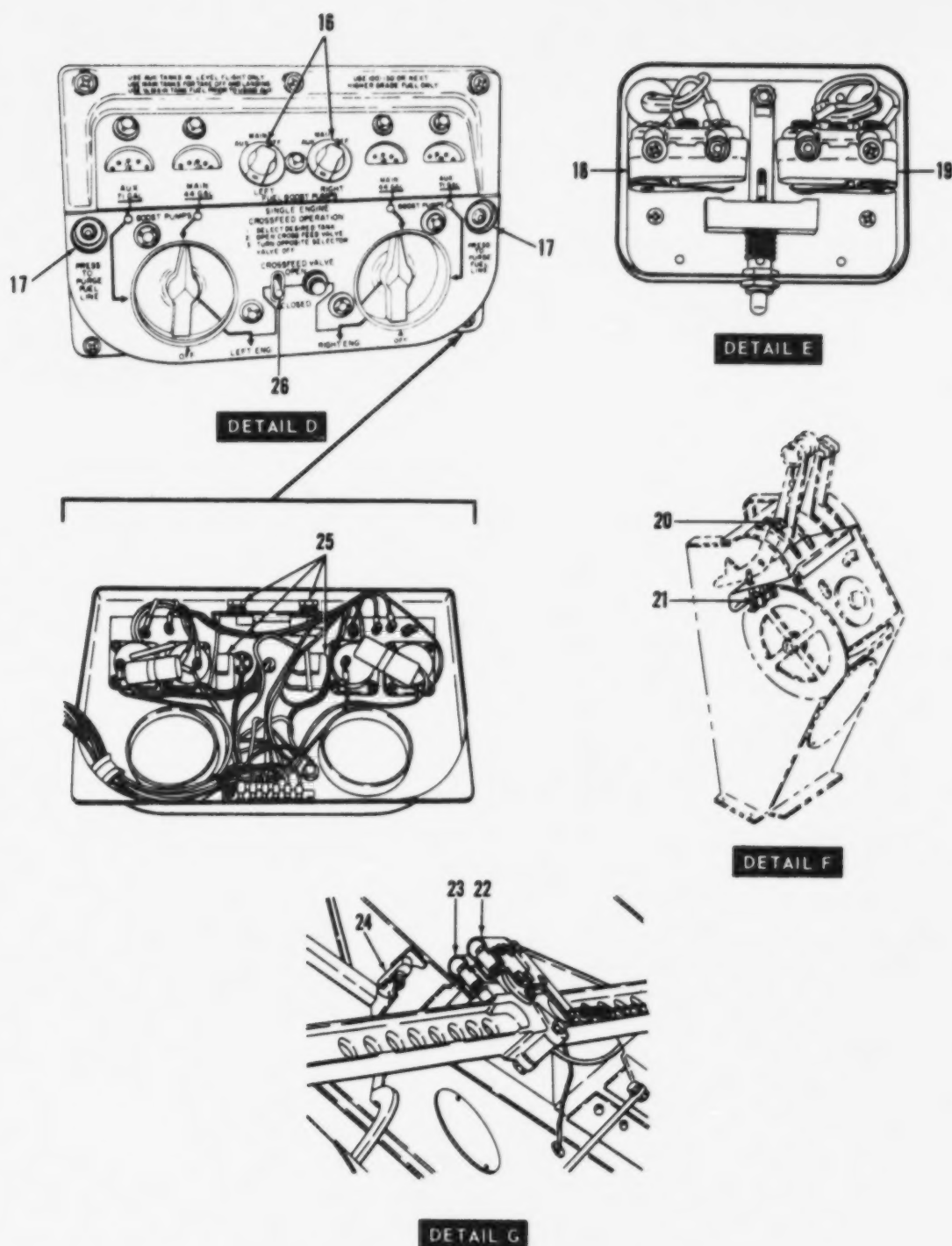
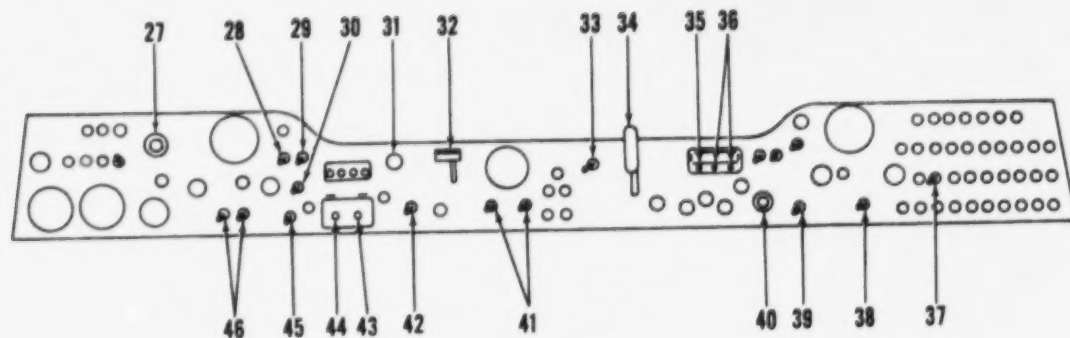
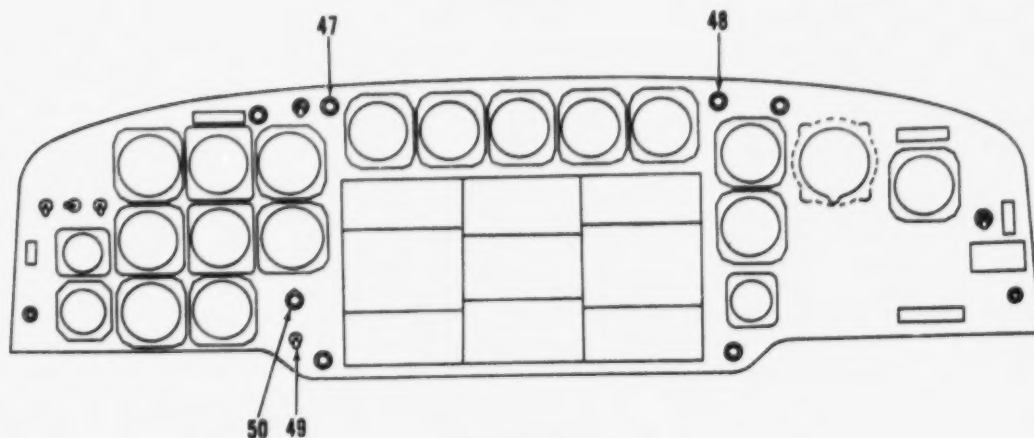


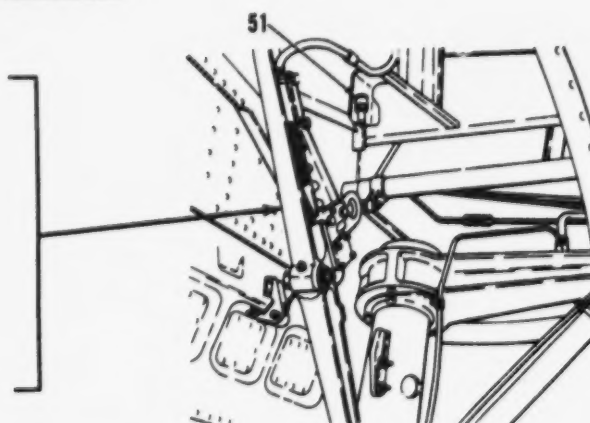
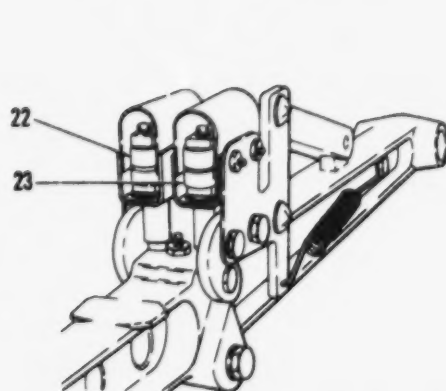
Figure 12-6. Switch locations (U-8F) (sheet 2 of 4)



DETAIL H



DETAIL J



DETAIL K

Figure 12-6. Switch locations (U-8F) (sheet 3 of 4)

- 
- | | | |
|---|--|---------------------------------------|
| 1. Flight instrument panel lights rheostat switch | 18. Landing gear warning and heater-blower safety switch | 35. Battery master switch |
| 2. Fuel and overhead panel lights rheostat switch | 19. Landing gear safety switch | 36. Generator master switches |
| 3. Engine instrument and radio panel lights rheostat switch | 20. Manual enrichment switches | 37. Cabin dome light switch |
| 4. Switch panel and tab indicator lights rheostat switch | 21. Throttle warning switches | 38. Cabin sign switch |
| 5. Map light rheostat switch | 22. Landing gear down lock switch | 39. Heater automatic-manual switch |
| 6. Cockpit red light rheostat switch | 23. Landing gear warning switch | 40. Temperature control rheostat |
| 7. Wing flap down limit switch | 24. Nose landing gear up lock switch | 41. Idle cutoff switches |
| 8. Wing flap up limit switch | 25. Fuel quantity indicator adjust rheostats | 42. Start selector switch |
| 9. Stall warning switch | 26. Fuel crossfeed valve switch | 43. Primer switch |
| 10. Landing gear down limit switch | 27. Propeller anti-icing switch | 44. Starter switch |
| 11. Landing gear up limit switch | 28. Taxi light switch | 45. Inverter switch |
| 12. Overhead reading light switches | 29. Navigation light switch | 46. Landing lights |
| 13. Cabin temperature control rheostat | 30. Anticollision light switch | 47. Free air temperature light switch |
| 14. Cabin door warning light switch | 31. Battery lock switch | 48. Warning horn silencer switch |
| 15. Threshold and baggage light switch | 32. Wing flap position switch | 49. Windshield anti-icing switch |
| 16. Fuel boost pump switches | 33. Alternate air switch | 50. Windshield wiper switch |
| 17. Fuel line purge switch | 34. Landing gear position switch | 51. Main landing gear up lock switch |

Figure 12-6. Switch locations (U-8F) (sheet 4 of 4)

(3) Inspect switch shank for distortion and malformed threads.

(4) Inspect control knob for cracks, broken pointer and stripped threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install rotary switch in mounting hole.

(3) Install lockwasher and retaining nut on shank of switch.

NOTE

On U-8F instrument subpanel, install edge-lighted panel, control knobs, bulbs, and light covers.

(4) Connect electrical wiring to proper terminals at rear of switch.

NOTE

On U-8F instrument subpanel, install cover plates at rear of subpanel.

12-21. CIRCUIT BREAKERS.

12-22. The circuit breakers are installed to protect aircraft wiring, batteries, and circuit components by isolating the circuit in which they are placed when an overload occurs. Circuit breakers are located in the front compartment floor, the instrument panel, the subpanel, and, in the RU-8D, in the overhead power distribution

panel. (See figures 12-7, 12-7A, and 12-8.) Power is supplied to the circuit breakers from the aircraft buses. All circuit breakers are of the thermal-overload trip type, and have push-to-reset or toggle manual controls. The circuit breakers are identified with the decal names of the circuits they protect. Push-to-reset circuit breakers are further identified with their ratings affixed in the center. Push-to-reset circuit breakers are manually reset by pushing on the top of the button until it engages. Toggle-type circuit breakers are manually reset by returning to the ON position in the same manner as a standard toggle switch. Toggle-type circuit breakers are differentiated from standard toggle switches by the ball at the end of the handle.

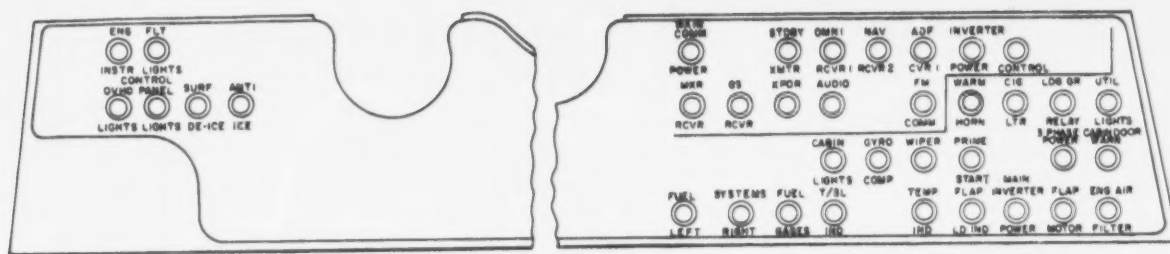
a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected. Disconnect battery.

(2) Disconnect bus bars and electrical wiring at rear of circuit breaker.

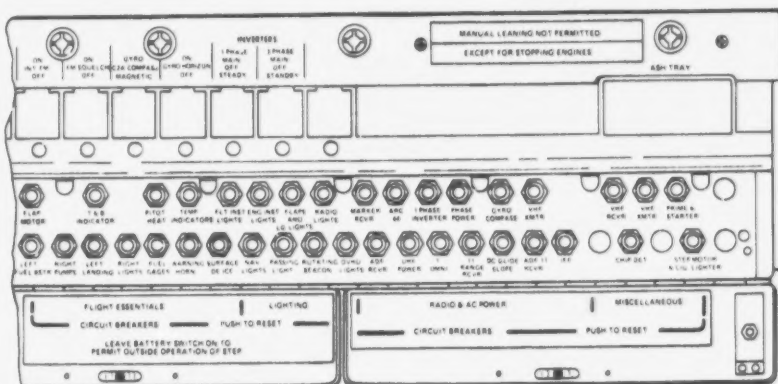
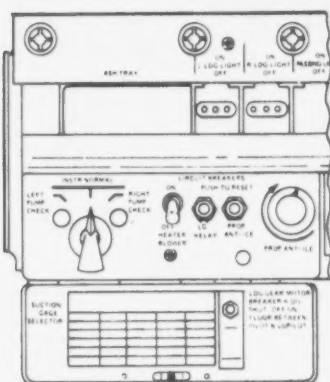
NOTE

On U-8F instrument subpanel, remove cover plates at rear to gain access to circuit breaker terminals.

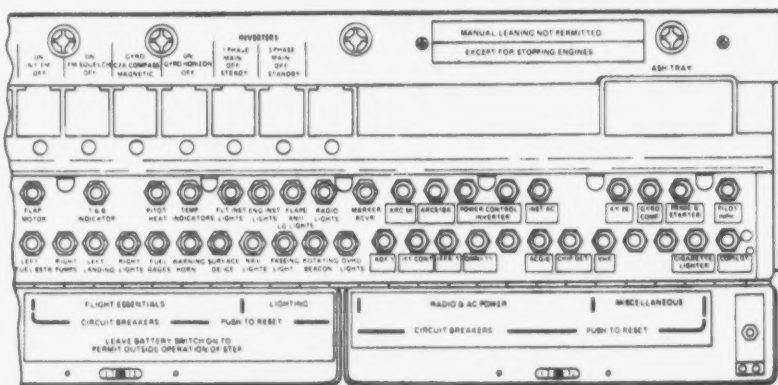
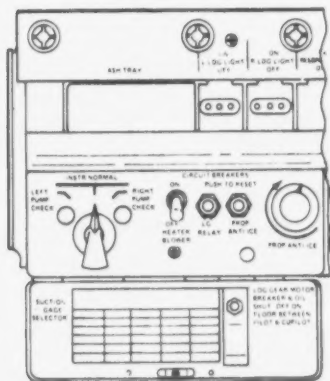
(3) At front of circuit breaker, remove retaining nut and lockwasher from shank, or remove retaining screws above and below breaker shank.



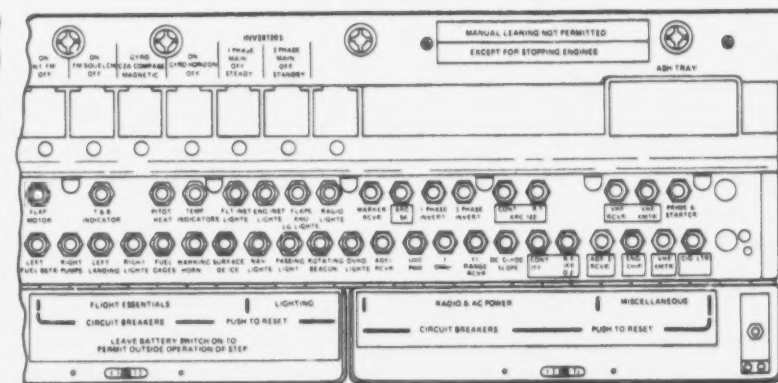
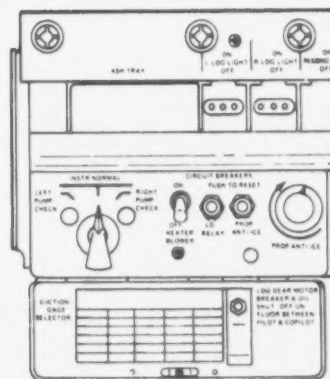
U-8F



U-8D

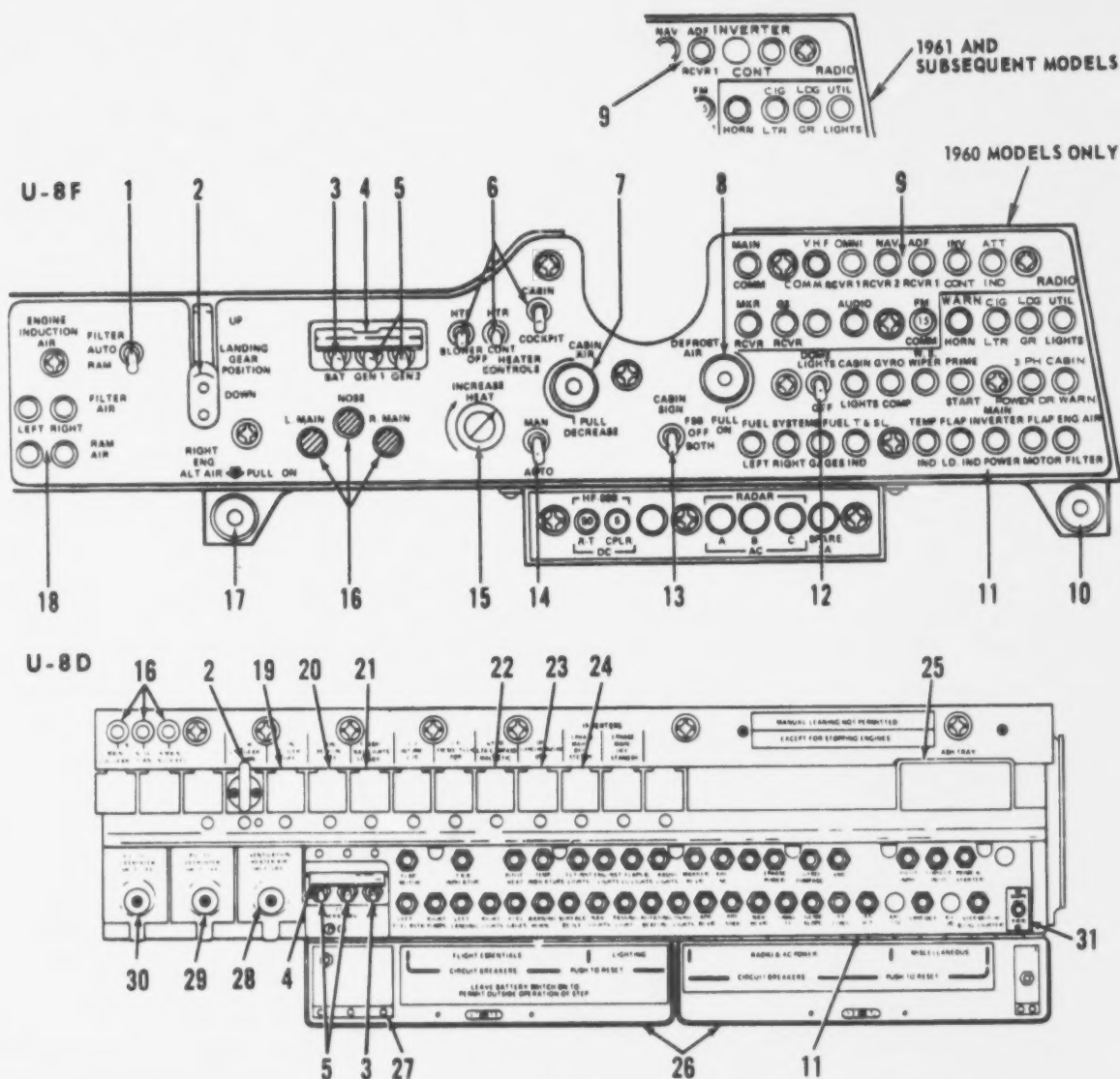


U-8G



RU-8D

Figure 12-7. Instrument subpanels



- | | |
|---|--|
| 1. Engine induction air control switch | 17. Right engine alternate air control |
| 2. Landing gear handle | 18. Engine induction air indicator lights |
| 3. Battery master switch | 19. Surface deicer switch |
| 4. Master switch gang bar | 20. Anticollision light switch |
| 5. Generator master switches | 21. Navigation lights flasher switch |
| 6. Heater control switches | 22. Gyro compass slaving cutout switch |
| 7. Cabin air control handle | 23. Attitude indicator control switch |
| 8. Defrost air control handle | 24. Inverter switch (one phase) |
| 9. Radio equipment circuit breakers | 25. Ash tray |
| 10. Copilot's air inlet control | 26. Right-hand subpanel doors |
| 11. Circuit breaker panel | 27. Guard |
| 12. Cabin domelight switch | 28. Ventilation heater air shut-off handle |
| 13. Cabin sign switch | 29. Copilot's defroster shut-off handle |
| 14. Heater manual-auto switch | 30. Pilot's defroster shut-off handle |
| 15. Heater temperature control rheostat | 31. Main inverter circuit breaker |
| 16. Landing gear position indicators | |

Figure 12-7A. Right-hand subpanels (U-8F and U-8D ASAC)

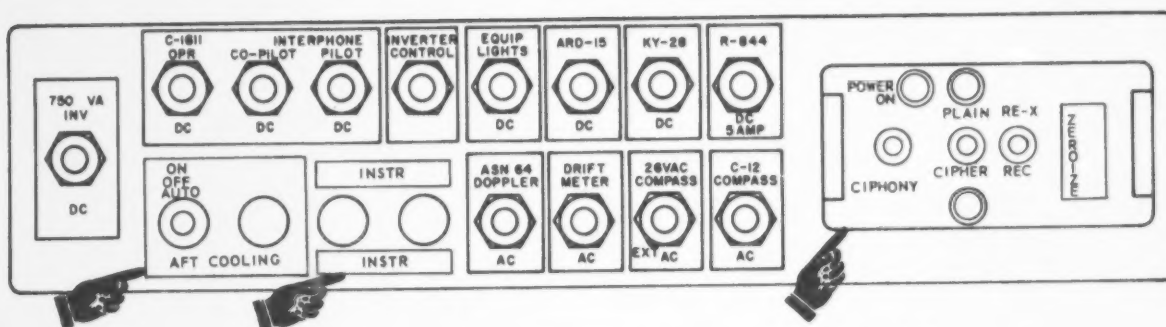


Figure 12-8. Overhead power distribution panel (RU-8D)

NOTE

On U-8F instrument subpanel, remove edge light covers and bulbs, and remove necessary control knobs. Remove edge-lighted panels to gain access to retaining nut and lockwasher.

(4) Remove circuit breaker from mounting hole.

b. Inspection. (1) Inspect terminals for security. Inspect terminal screws and mounting screws for malformed threads, corrosion, and damage.

(2) Inspect circuit breaker case for cracks and chipping.

(3) Inspect mounting bracket for distortion and malformed threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected. Disconnect battery.

(2) Install circuit breaker in mounting hole.

(3) Install lockwasher and retaining nut, or install mounting screws at front of circuit breaker.

NOTE

On U-8F instrument subpanel, install edge-lighted panel, control knobs, bulbs and light covers.

(4) Connect bus bars and electrical wiring to rear of circuit breaker.

NOTE

On U-8F instrument subpanel, install cover plates at rear of subpanel.

d. Operational check. Engage circuit breaker and attempt to operate system which circuit breaker protects. Operation of system indicates proper operation of circuit breaker.

12-23. EXTERNAL POWER RECEPTACLE.

12-24. The external power receptacle (figure 12-9) is accessible through a door in the outboard side of the left engine nacelle. The external power receptacle serves as a connection between an external power supply and the aircraft electrical bus system. External dc power is supplied through the center pin of the receptacle, and the remaining large pin serves as a ground return. The smaller pin is not connected in the U-8 aircraft installation and serves as a polarizing pin to prevent improper connections from being made.

CAUTION

Do not connect a live external power source plug to aircraft. Turn external power source off to prevent arcing as plug and mating receptacle make contact.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected. Disconnect battery.

(2) On outboard side of left engine nacelle release fastener (12, figure 12-9) and open door (11). Unfasten necessary cowling to gain access to rear of external power receptacle.

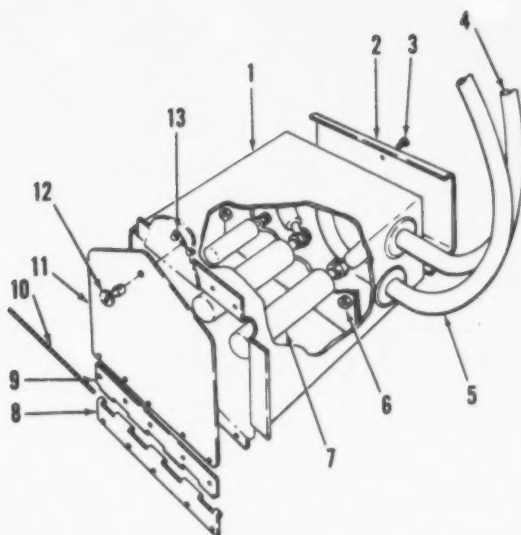
(3) Remove screw (3) and lid (2) at rear of box assembly (1). Remove attaching hardware and ground cable (4). Remove attaching hardware and positive cable (5).

(4) Remove bolt, washer, and nut (6) at each side of connector (7). Remove connector.

NOTE

Remove following components only if inspection proves them defective.

(5) Remove attaching hardware and lockspring (13).



- | | | |
|-------------------|----------------------|----------------|
| 1. Box assembly | 6. Bolt, washer, nut | 10. Hinge pin |
| 2. Lid | 7. Connector | 11. Door |
| 3. Screw | 8. Hinge | 12. Fastener |
| 4. Ground cable | 9. Hinge | 13. Lockspring |
| 5. Positive cable | | |

Figure 12-9. External power receptacle

- (6) Remove retainer and fastener (12).
- (7) Withdraw hinge pin (10) and remove door (11) and hinge (9) as a unit.
- (8) Remove hinges (8 and 9) by drilling out rivets.
- (9) Remove box assembly (1) by drilling out rivets.
- b. Inspection. (1) Inspect terminals for corrosion, misalignment, signs of arcing, and security.
- (2) Inspect mounting hardware for malformed and/or stripped threads.
- (3) Inspect cables for worn or damaged insulation.
- (4) Inspect hinges, hinge pins, door, cover, and box assembly for dents, misalignment and corrosion.
- c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.
- (2) Install box assembly (1, figure 12-9) and secure with rivets.
- (3) Install hinges (8 and 9) on door (11) and aircraft skin and secure with rivets. Install hinge pin (10).

NOTE

If aircraft skin and/or door have been replaced, locate rivet holes in door and aircraft skin by assembling hinges (8 and 9) and hinge pin (10), and using assembly as a template to locate and drill rivet holes. Remove hinge pin (10) and rivet hinges (8 and 9) to door (11) and aircraft skin. Install hinge pin (10).

- (4) Install fastener (12) and secure with retainer.
- (5) Install lockspring (13) and secure with attaching hardware.
- (6) Install connector (7) and secure with bolt, washer, and nut (6) at each side.
- (7) Install positive cable (5) to center terminal of connector (7) and secure with attaching hardware. Install ground cable (4) to remaining large terminal and secure with attaching hardware. Install lid (2) at rear of box and secure with screw (3).
- (8) Close door (11) and secure with fastener (12). Secure engine cowl.

12-25. ENGINE STARTER SYSTEM.

12-26. Each engine is equipped with an electric, direct-drive starter (figure 12-10) mounted on the left side of the engine accessory housing. Power to operate each starter is controlled by a relay mounted in the respective main wheel well. On U-8D, U-8G, and RU-8D aircraft the starter relays are actuated by separate pushbuttons located at the extreme left of the instrument panel. On U-8F aircraft, starter relay actuation is accomplished by means of guarded pushbutton on L-R selector switches. U-8D, U-8G, and RU-8D aircraft are equipped with a dual microswitch to turn on the light in the nose equipment compartment and deactivate the starter circuit when the compartment door is opened.

WARNING

Do not tamper with the dual microswitch, located on the nose equipment compartment door frame, or attempt to defeat its purpose. The switch is provided to prevent serious injury or death to personnel and damage to equipment by interrupting power to the starter circuit.

- a. Troubleshooting. Troubleshooting procedures for the engine starter system are accomplished as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Both starters inoperative.	Defective PRIMER & STARTER circuit breaker.	Replace circuit breaker. (Refer to paragraph 12-21.)
	Defective dual microswitch in nose equipment compartment (U-8D, U-8G, and RU-8D.)	Replace dual microswitch. (Refer to paragraph 12-35.)
Either starter inoperative. Other starter operates normally.	Defective starter switch.	Replace starter switch. (Refer to paragraph 12-31.)
	Defective toggle switch (U-8F).	Replace toggle switch. (Refer to paragraph 12-33.)
	Defective starter relay.	Replace starter relay. (Refer to paragraph 12-29.)
	Defective starter.	Replace starter. (Refer to paragraph 12-29.)

b. Operational check. (1) Engage PRIMER & STARTER circuit breaker, and connect an external power source to aircraft.

NOTE

Steps (2) through (4) apply to U-8D, U-8G, and RU-8D aircraft only.

(2) Open nose equipment compartment door and observe light to make sure it comes on.

(3) Leave door open and attempt to start engines in accordance with TM 55-1510-201-10. Starter circuits should be inoperative on both engines.

WARNING

Engine operation will be accomplished by authorized personnel only.

(4) Close nose equipment compartment door and secure properly.

(5) Start engines in accordance with TM 55-1510-201-10. Starters should operate normally.

(6) Shut down engines in accordance with TM 55-1510-201-10. Disconnect external power source.

12-27. STARTER.

12-28. The starter is an intermittent-duty, series-wound electric motor. The drive elements consist of a reduction gear assembly, multiple-disc clutch, automatic engaging device, and driving jaw. The multiple-disc clutch allows slippage during initial engagement and during excessive starting torque.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure

external power source is disconnected. Disconnect battery.

(2) Open engine cowling to gain access to starter.

(3) Disconnect starter and generator suppressor electrical connections.

(4) Remove nuts and washers from mounting studs.

(5) Pull starter in an aft direction to disengage and lift up to remove. Remove gasket.

b. Inspection. (1) Remove starter and inspect starter jaw and engine jaw for evidence of damage from starter dragging on engine jaw. If damage is present, replace the starter and replace the engine jaw. If no damage is noted, check starter jaw travel from fully retracted to fully advanced position. Check travel by rotating, or push in until fully retracted. Rotate starter jaw to the fully advanced position. If binding or sticking is noted, replace the starter.

(2) Inspect mounting holes for elongation and cracks.

(3) Inspect mating surfaces of gasket, starter, and accessory housing for scoring or other condition which would prevent a liquid tight seal.

(4) Inspect mounting studs and hardware for distortion and malformed threads.

(5) Inspect connecting wiring for fraying and security of terminals.

(6) Inspect terminals for malformation and broken or missing insulation.

(7) Starter Jaw Clearance. (a) Place a suitable straight edge across gasket on starter mounting pad of engine accessory housing. Using a 6-inch scale, measure and note the distance from the

straight edge to the top of the teeth of engine starter jaw.

b. Place the straight edge across the teeth of the jaw of starter, measure and note the distance from the straight edge to the mounting flange of starter.

c. Subtract the measurement taken in b above from that taken in a above to find the starter jaw clearance. A minimum of 0.030 and maximum of 0.180 is allowable.

(8) Inspect brushes for wear, if brush is worn to the vertical wear mark on side of brush, replace starter. Check brush springs for evidence of overheating and distortion. Check that spring makes firm contact with brush.

(9) Inspect armature for excessive wear, scoring, or high mica condition.

(10) Turn armature by hand to inspect for binding.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Prior to installing the starter, extend the starter jaw to the end of its travel and coat the lateral surface of the jaw with lubricant, item 81, table 1-8, then extend and retract the jaw several times to distribute the compound evenly over the surface.

(3) Install serviceable gasket and starter on engine accessory housing.

(4) Install washers and nuts on starter mounting studs. Torque nuts to 260 inch-pounds.

(5) Install starter leads to proper terminals on starter. Torque nuts to 45-55 inch-pounds.

CAUTION

Overtorque will cause internal damage.

(6) Secure engine cowling.

12-29. STARTER RELAYS.

12-30. The single pole starter relays make possible pushbutton control for the engine starters. Each starter relay has contact capacity of 200 amperes and a coil rating of 24 volts. The starter relays are mounted in the left and right main wheel wells.

a. Removal. (1) Place battery and generator master switches in the OFF position. Make sure external power source is disconnected.

(2) Remove attaching hardware and disconnect wiring from starter relay.

(3) Remove attaching hardware and starter relay.

b. Inspection. (1) Inspect starter relay case for cracks or dents.

(2) Inspect terminal lugs for distortion and stripped threads.

(3) Inspect terminal nuts and mounting screws for stripped threads.

(4) Inspect contacts for excessive pitting and corrosion.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install starter relay on mounting bracket and secure with attaching hardware.

(3) Install wiring to starter relay and secure with attaching hardware.

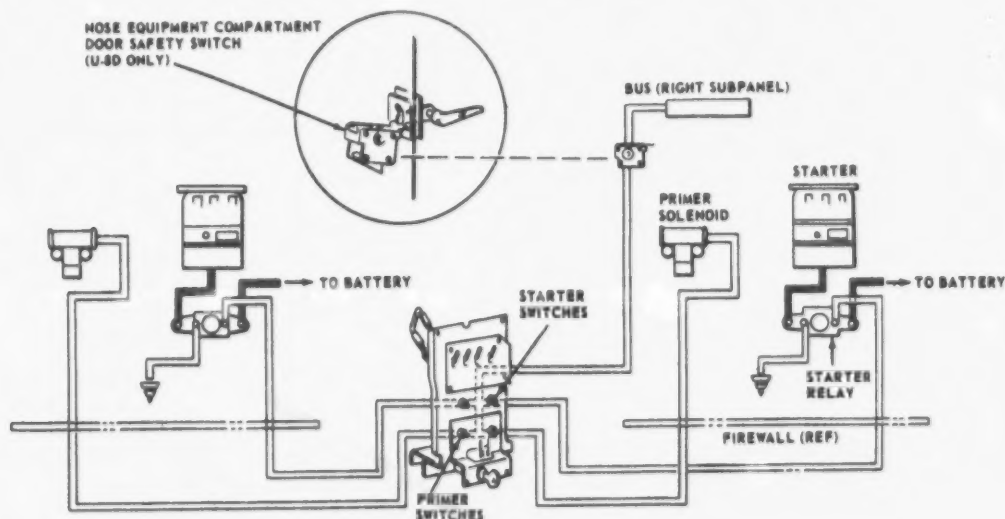


Figure 12-10. Starting system

12-31. STARTER SWITCHES. (U-8D, U-8G, RU-8D).

12-32. Control of the starter system is provided by two pushbutton switches. In the U-8D

(STD) and RU-8D the switches are mounted on the extreme left side of the instrument panels. The switches in the U-8D (ASAC) and U-8G are mounted on the left fuselage wall above the fuel selector panel.

a. Removal. (1) Place battery and generator master switches in the OFF position. Make sure external power source is disconnected.

(2) Remove screw from lower left corner of edge-lighted panel.

(3) Remove recessed lights and detach edge-lighted panel from switch panel.

(4) U-8D (ASAC) and U-8G aircraft, remove screws securing switch panel to fuselage wall to gain access to rear of switch panel.

(5) Remove switch retainer nut and pull switch out of instrument panel.

(6) Disconnect switch wiring and remove switch.

b. Inspection. (1) Inspect terminals for security. Inspect terminal screws and mounting hardware for malformed threads, corrosion, and damage.

(2) Inspect body of switch for cracks or chipping.

(3) Inspect mounting bracket for distortion and malformed threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to switch.

(3) Position switch in instrument panel and install retainer nut.

(4) In U-8D (ASAC) and U-8G aircraft, secure the switch panel to fuselage wall with screws.

(5) Install edge-lighted panel with attaching screw and recessed bulbs.

12-33. STARTER SWITCHES. (U-8F)

12-34. Control of the starter system is provided by a pushbutton switch and a two-position toggle switch. The toggle switch is used to select the engine to be started, and the pushbutton switch is used to actuate the selected starter by means of the associated starter relay.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove pushbutton switch in accordance with paragraph 12-31.

(3) Remove doors from rear of subpanel by removing attaching screws.

(4) Remove knob and retainer nut from toggle switch and pull the switch from subpanel.

(5) Disconnect wiring from switch.

b. Inspection. (1) Inspect terminals for security. Inspect terminal screws and mounting hardware for malformed threads, corrosion and damage.

(2) Inspect switch body for cracks or chipping.

(3) Inspect mounting bracket for distortion and malformed threads.

(4) Inspect switches for proper action when operated.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to switch.

(3) Position switch in subpanel and install retainer nut.

(4) Install doors on back of subpanel and install recessed bulbs, indicator light covers, and knob.

(5) Install pushbutton switch in accordance with paragraph 12-31.

12-35. DUAL MICROSWITCH. (U-8D, U-8G, RU-8D)

12-36. The dual microswitch, located on the door frame of the nose equipment compartment serves two purposes when the compartment door is opened: first, the normally closed contacts turn on the light in the interior of the nose equipment compartment; second, the normally open contacts serve to isolate the starter circuit, preventing the engines from being started when the compartment door is opened.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Open nose equipment compartment door and remove attaching hardware from dual microswitch.

(3) Disconnect wiring and remove dual microswitch.

b. Inspection. (1) Inspect mounting hardware and mounting bracket for distortion and malformed threads.

(2) Inspect dual microswitch for chipping, cracks, and loose terminals.

(3) Inspect actuating spring for distortion and wear.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to proper terminals.

(3) Install dual microswitch and secure with attaching hardware.

12-37. CHIP DETECTOR SYSTEM.

12-38. The chip detector system provides the pilot with a positive indication of metal particles

in each engine oil system. The system consists of a magnetic chip detector, located in the oil scavenge pump screw assembly of each engine, and an amber warning light mounted above each corresponding engine gage unit. Ferrous particles present in the oil are attracted by the magnetic chip detector. Presence of sufficient small particles or a large particle bridges the gap between the chip detector body and an isolated center terminal, completing an electrical circuit and causing the warning light to come on. Power for the system is provided by a circuit breaker on the instrument subpanel.

a. Removal. (1) Remove necessary engine cowling to gain access to chip detector.
(2) Unsafely electrical connector and disconnect electrical connector from chip detector.
(3) Unsafely chip detector and remove chip detector from oil scavenge pump screen assembly.

b. Inspection. (1) Inspect chip detector for distorted threads.
(2) Inspect wiring for oil soaked condition, fraying, and security of terminals.
(3) Inspect warning lights in accordance with paragraph 12-235.

c. Test. (1) Power ON.

(2) Functionally check chip detectors circuits by shorting center terminal shaft of chip detector plug to engine; cockpit warning light should glow.

d. Installation. (1) Place battery and generator switches in OFF position. Ensure that external power source is disconnected.

(2) Install chip detector in oil scavenge pump screen assembly. Safety chip detector to oil scavenge pump screen assembly.

(3) Install electrical connector to chip detector. Safety electrical connector to chip detector.

(4) Replace engine cowling.

12-39. LANDING GEAR ELECTRICAL SYSTEM. (U-8D, U-8G, RU-8D)

12-40. The landing gear is retracted and extended by a single dc motor operating through a system of jackscrew actuators, drive shafts, drive chains and gears. The mechanical portion of the landing gear system is described in paragraphs 4-249 through 4-317. The electrical system also includes gear-up warning circuits, landing gear position indicators, and limit

switches. A relay energized by a two-position control switch, provides power to the landing gear motor. Two limit switches open the relay circuits when the landing gear is either fully extended or retracted. U-8D aircraft serial No. 58-1362; U-8G aircraft serial Nos. 58-1357, 58-1359, 58-1360, 58-1363, and 58-1364; and RU-8D serial Nos. 58-1358 and 58-1361 are equipped with two limit switches, one on each of the main gear. (See figure 12-5.) The limit switch on the left main gear energizes a locking solenoid which locks the landing gear handle in the DOWN position when the aircraft is on the ground. An override lever, under the control handle, may be pushed aside to allow the handle to be moved to the GEAR-UP position.

CAUTION

The override lever must never be used except in an emergency. The gear will collapse when the handle is moved to the GEAR - UP position.

The main power circuit to the motor is protected by a 50-ampere push-to-reset circuit breaker mounted to the floorboard in front of the pilot's seat. The control relay circuit is protected by a 3-ampere circuit breaker mounted on the left subpanel. When the landing gear handle is placed in the GEAR-UP position, the control switch energizes the up solenoid in the control relay through the up limit switches. The relay closes and completes the circuit from the landing gear circuit breaker to the up windings in the landing gear motor. When the landing gear handle is placed in the DOWN position the control switch energizes the down solenoid in the control relay through the down limit switch and completes the circuit from the landing gear circuit breaker to the down windings of the landing gear motor. The control relay dynamically brakes the motor to prevent overtravel of the gear by completing a ground circuit through the armature and the field winding when the control circuit is opened by either of the limit switches. A spring-loaded lock prevents moving the control handle inadvertently. The lock must be pushed to the left before the handle can be moved from either position. For troubleshooting procedures for the landing gear electrical system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Landing gear will not retract or lower.	Landing gear relay circuit breaker disengaged.	Engage circuit breaker.
	Landing gear motor circuit breaker disengaged.	Engage the circuit breaker.
	Defective motor ground connection	Clean and tighten connection.
	Open circuit.	Check continuity of following circuits: left subpanel bus bar to relay circuit breaker, relay circuit breaker to landing gear control switch, main belly terminal post to motor circuit breaker, and motor circuit breaker to terminal 3 of control relay.
Landing gear will lower but not retract.	Defective landing gear control switch.	Notify direct support maintenance.
	Defective landing gear control relay.	Replace relay. (Refer to paragraph 12-43.)
	Open circuit.	Check continuity of following circuits: landing gear control switch to safety switch, safety switch to up limit switch, up limit switch to terminal C1 of control relay, and terminal 1 of control relay to retract motor. The following continuity checks apply only to aircraft serial No. 58-1357 through 58-1364: landing gear control switch to up limit switch, up limit switch to terminal C1 of control relay, and terminal 1 of control relay to retract motor.
	Defective limit switch.	Replace switch. (Refer to paragraph 12-51.)
	Defective landing gear control relay.	Replace relay. (Refer to paragraph 12-43.)
	Defective limit switch.	Replace switch. (Refer to paragraph 12-17.)
Landing gear will retract but not lower.	Landing gear motor up windings defective.	Notify direct support maintenance.
	Open circuit.	Check continuity of following circuits: landing gear control switch to down limit switch, down limit switch to terminal C2 of control relay, and terminal 2 of control relay to retract motor.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Relay circuit breaker trips in both landing gear switch positions.	Defective control switch.	Replace switch. (Refer to paragraph 12-17.)
	Defective limit switch.	Replace switch. (Refer to paragraph 12-51.)
	Defective landing gear control relay.	Replace relay. (Refer to paragraph 12-43.)
	Landing gear motor down windings defective.	Notify direct support maintenance.
	Grounded circuit.	Test for grounds in following circuits: relay circuit breaker to control switch, and control switch to locking solenoid in aircraft serial No. 58-1357 through 58-1364.
Relay circuit breaker trips when landing gear control handle is in UP position only.	Grounded circuit.	Test for grounds in following circuits: control switch to safety switch, safety switch to up limit switch, and up limit switch to control relay. On aircraft serial No. 58-1357 through 58-1364, check for grounds in the following circuits: control switch to up limit switch, and up limit switch to terminal C1 of control relay.
Relay circuit breaker trips when landing gear control handle is in DOWN position only.	Grounded circuit.	Test for grounds in following circuits: control switch to down limit switch, and down limit switch to terminal C2 of control relay.
Motor circuit breaker tripping.	Grounded circuit.	Test for grounds in following circuits: circuit breaker to control relay and control relay to retract motor.
Landing gear handle cannot be moved to the GEAR-UP position (applicable only on U-8D aircraft serial No. 58-1357 through 58-1364.)	Mechanical defect in gear causing overload.	Check system for binding, interference, etc.
	Open locking solenoid circuit.	Check continuity of following circuits: control switch to locking solenoid, locking solenoid to right gear safety switch, and right gear safety switch to left gear safety switch.
	Left gear safety switch not properly grounded.	Clean and tighten connection.
	Defective limit switches.	Replace switches. (Refer to paragraph 12-51.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
	Limit switches out of adjustment.	Notify direct support maintenance.
Landing gear motor fails to shut off when gear is retracted or gear does not completely retract.	Up limit switch out of adjustment. Defective up limit switch.	Notify direct support maintenance. Replace switch. (Refer to paragraph 12-51.)
Landing gear motor fails to shut off when gear is extended or gear fails to completely extend.	Down limit switch out of adjustment. Defective down limit switch.	Notify direct support maintenance. Replace switch. (Refer to paragraph 12-51.)
All indicator lights are inoperative when gear is down.	Open circuit. Indicator circuit breaker tripped.	Check continuity of following circuits: right subpanel bus bar to indicator, circuit breaker to navigation light switch, and navigation light switch to indicator lights. Reset circuit breaker.
One indicator light is inoperative.	Open circuit. Loose ground connection at limit switch. Defective limit switch. Limit switch out of adjustment. Defective light.	Check continuity between light assembly and down lock switch. Clean and tighten connection. Replace switch. (Refer to paragraph 12-51.) Notify direct support maintenance. Replace light (Refer to paragraph 12-235.)
Indicator circuit breaker tripping.	Grounded circuit.	Check for a ground in the circuit between circuit breaker and navigation light switch and light socket.
Indicator lights inoperative with navigation lights ON.	Open circuit.	Check continuity of dimming circuit at navigation light switch.
Indicator light stays on when gear is retracted.	Grounded circuit. Defective limit switch. Defective light.	Test for a ground between light assembly and down lock switch. Replace switch. (Refer to paragraph 12-51.) Replace light. (Refer to paragraph 12-235.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Warning horn inoperative in all phases of operation.	Defective horn silencer relay.	Replace relay. (Refer to paragraph 12-59.)
	Defective landing gear warning horn silencer.	Replace silencer. (Refer to paragraph 12-57.)
	Open circuit.	Check continuity between circuit breaker and warning horn, warning horn and silencer relay, and silencer relay and throttle switches.
	Grounded circuit.	Check for ground between relay and silencing switch.
	Defective warning horn.	Replace warning horn. (Refer to paragraph 12-53.)
Warning horn inoperative when landing gear control handle is UP and weight of aircraft is on struts, but operates when a throttle is closed and the gear is up.	Open circuit.	Check continuity between throttle switches, between right throttle switch and right gear safety switch, and between safety switch and landing gear control switch.
	Poor ground at landing gear control switch.	Clean and tighten connection. (On aircraft serial No. 58-1357 through 58-1364, a loose ground connection will prevent the radar antenna from retracting when the landing gear is lowered.)
	Defective landing gear control switch.	Replace switch. (Refer to paragraph 12-17.)
	Defective limit switch.	Replace limit switch. (Refer to paragraph 12-51.)
	Limit switch out of adjustment.	Notify direct support maintenance.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Warning horn inoperative when throttle is closed and landing gear is up, but operates when weight of aircraft is on struts and control handle is UP.	Landing gear warning horn switches out of adjustment.	Readjust switch. (Refer to paragraph 12-49.)
	Defective landing gear warning horn switch.	Replace switch. (Refer to paragraph 12-49.)
	Open circuit.	Check continuity of circuit between right throttle switch and right landing gear terminal strip.
Warning horn fails to shut off.	One or more limit switches out of adjustment.	Notify direct support maintenance.
	Defective limit switch.	Notify direct support maintenance.
	Grounded circuit.	Test for grounds in following circuits: warning horn to silencing relay, silencing relay to throttle switches, right throttle switch to safety switch, safety switch to landing gear control switch (when weight of airplane is on strut), and right throttle switch to warning horn switches with throttle switch closed.
	Defective landing gear control switch.	Replace landing gear control switch. (Refer to paragraph 12-17.)
Warning light inoperative.	Open circuit.	Check continuity in circuits between circuit breaker and light assembly, and between light assembly and light test switch.
	Defective lamp.	Replace lamp. (See figure 12-11.)
	Defective light.	Replace light. (Refer to paragraph 12-235.)
	Limit switches out of adjustment.	Notify direct support maintenance.
	Defective limit switch.	Replace switch. (Refer to paragraph 12-51.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Warning light and horn circuit breaker tripping.	Defective landing gear control switch.	Replace switch. (Refer to paragraph 12-51.)
	Grounded circuit.	Check continuity of circuit between circuit breaker and resistor, light, warning horn, and silencing relay.

12-41. LANDING GEAR MOTOR. (U-8D, U-8G, RU-8D)

12-42. The landing gear system is driven by a reversible dc motor attached to a gearbox. The motor and gearbox drives the cross-shafts which retract and extend the landing gear. At the same time, it drives the jackscrew which operates the limit switch actuator. The assembly is mounted to the rear main spar beneath the right front seat. The landing gear motor requires no maintenance applicable to organizational level maintenance.

12-43. LANDING GEAR CONTROL RELAY. (U-8D, U-8G, RU-8 D)

12-44. The landing gear control relay is located in the cabin beneath the right front seat. It applies power to the landing gear motor, and dynamically brakes the motor to prevent over-travel of the landing gear. Power to the relay coils is controlled by the landing gear control switch and the up and down limit switches. The relay is a double solenoid type relay with each solenoid acting as a double-pole, single-throw relay. One solenoid provides power to the landing gear motor to retract the gear; the other solenoid provides power to extend the gear.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove right front seat in accordance with paragraph 4-60 or 4-114.

(3) Remove access panel from right side of seat mounting structure.

(4) Tag and disconnect wiring from relay.

(5) Remove relay mounting bolts and remove relay.

b. Inspection. (1) Inspect terminal 1 nuts, mounting screws, and electrical terminals for malformed threads and corrosion.

(2) Inspect wiring for fraying and deterioration of insulation.

(3) Inspect relay case for cracks and elongated mounting holes.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install relay on bracket and secure with mounting bolts.

(3) Remove tags and install wiring to proper terminals.

(4) Install access panel at right side of seat mounting structure.

(5) Install right front seat in accordance with paragraph 4-60 or 4-114.

12-45. LANDING GEAR CONTROL SWITCH. (U-8D, U-8G, RU-8D)

12-46. The landing gear control switch is a double pole, double throw toggle switch mounted on the instrument subpanel and used to control the landing gear electrical system. For maintenance instructions, refer to paragraph 12-17.

12-47. LANDING GEAR WARNING SYSTEM. (U-8D, U-8G, RU-8D)

12-48. The landing gear warning system consists of a warning horn, a flasher unit, four throttle switches, three down lock switches, a silencer relay and a silencer button. The flasher and resistor unit causes the horn to sound intermittently so that it can be distinguished from the continuous sound of the stall warning horn. The landing gear warning horn circuit is wired through the throttle switches to the down lock switches on each gear. If either throttle is retarded below 16 inches manifold pressure while the gear is not completely locked in the DOWN position, the warning horn will sound. If the landing gear handle is moved to the GEAR-UP position while the aircraft is on the ground, the limit switch will cause the horn to sound by completing a ground circuit through the landing gear control switch. In addition to the horn, a warning light illuminates the control handle when the position of the handle does not correspond

to the position of the gear. The bulb can be tested by pressing the test button on the instrument panel. The warning horn can be silenced with the silencer button on the instrument panel. The horn will remain silent until both throttles are advanced and then one or both are retarded below 16 inches manifold pressure or until the landing gear is lowered. The circuit is protected by a 3 -ampere circuit breaker on the right-hand subpanel.

12-49. LANDING GEAR WARNING HORN SWITCHES. (U-8D, U-8G, RU-8D)

12-50. The landing gear warning horn switches are single pole microswitches mounted to a bracket in the engine control pedestal. Each switch is operated by a mechanical linkage and cam device attached to each throttle rod. When the landing gear is not down and locked, retarding the throttles causes the landing gear warning horn to sound.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove cotter pin, washer, and attaching pin connecting switch actuating rods to throttle levers.

(3) Pull rods down and out of switch installation.

(4) Remove screws attaching switch mounting bracket to pedestal. Pull bracket down, twisting forward side down first.

(5) Disconnect wiring from switch.

(6) Remove nut from each switch mounting rod. Pull rods out of bracket and remove switches.

b. Inspection. (1) Inspect terminals for distortion, malformed threads and corrosion.

(2) Operate switch by hand and observe for proper toggle action as actuator is depressed and released.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Insert each mounting rod through brackets, switches, washers, and spacers. Install nut on each rod.

(3) Connect wiring to switches.

(4) Position assembly in pedestal and install attaching screws.

(5) Insert actuating rods through switch and pedestal.

(6) Insert attaching pin through each rod and throttle lever. Install washer and cotter pin on each rod.

d. Adjustment. (1) Set parking brakes and chock

wheels. Start engines in accordance with applicable operator's manual (-10).

(2) Adjust throttles so manifold pressure gage registers 16 inches Hg. for each engine with propellers in low pitch.

(3) Stop engines with idle shut off control without disturbing throttle settings.

(4) Adjust threaded linkage between the throttle lever and the cam until cams trip switches.

NOTE

Approximately one-third of a turn of adjustment nuts compensate for 1 inch of manifold pressure.

(5) Flight test the aircraft to determine if the warning system functions properly.

12-51. LANDING GEAR LIMIT SWITCHES. (U-8D, U-8G, RU-8D)

12-52. The landing gear limit switches are located in the cabin under the right front seat. The switches are operated by an actuator on a jackscrew driven by the landing gear motor. (See figure 12-5.)

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove right front seat in accordance with paragraph 4-60 or 4-114.

(3) Remove access panel from above right side of seat mounting structure.

(4) Disconnect wiring from limit switches.

(5) Remove switch retaining nuts and pull switches from mounting bracket.

(6) Remove switches from actuators by removing attaching screws and nuts.

b. Inspection. (1) Inspect terminals for distortion, malformed threads and corrosion.

(2) Operate switch by hand and observe for proper toggle action as actuator is depressed and released.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Assemble switch and actuator and secure with attaching screws and nuts.

(3) Position a switch and actuator assembly in each end of switch mounting bracket and install retaining nuts.

(4) Connect wiring to proper terminals.

(5) Install access panel on seat mounting structure.

(6) Install right front seat in accordance with paragraph 4-60 or 4-114.

12-53. LANDING GEAR WARNING HORN. (U-8D, U-8G, RU-8D)

12-54. The landing gear warning horn is mounted to the panel wiring support behind the left side of the instrument panel. The horn is operated through the landing gear warning switches on the throttle controls. A flasher unit in the circuit causes the horn to sound intermittently.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect wiring from landing gear warning horn.

(3) Remove nuts, washers, spacers, and mounting screws from horn mounting flange and support. Remove horn.

b. Inspection. (1) Inspect terminals for distortion, malformed threads, and corrosion.

(2) Inspect for elongated mounting holes, corrosion, and cracks on body of horn.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install mounting screws and spacers. Install horn, washers, and nuts.

(3) Connect wiring to landing gear warning horn.

12-55. LANDING GEAR WARNING HORN FLASHER.(U-8D, U-8G, RU-8D)

12-56. The landing gear warning horn flasher is mounted to the panel wiring support adjacent to the landing gear warning horn behind the left side of the instrument panel. The flasher causes the horn to sound intermittently so that the sound may be distinguished from that of the stall warning horn, which sounds continuously.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Slip flasher unit from mounting studs on the connector block.

(3) Disconnect wiring from left-hand subpanel support terminal strip.

(4) Remove screws, washers and nuts which secure connector block to support.

(5) Disconnect wiring from connector block to warning horn. Remove connector block.

b. Inspection. (1) Inspect flasher unit for cracked body and corroded terminals.

(2) Inspect mounting studs for damage and security. Make sure mounting studs retain flasher unit securely.

(3) Inspect connector block to security of terminals, cracks, and elongated mounting holes. Inspect terminals for distortion and malformed threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring from warning horn to proper terminal on connector block.

(3) Mount connector block and resistor to left-hand subpanel wiring support. Secure with screws, washers, and nuts.

(4) Connect wiring to support terminal strip.

(5) Snap flasher unit onto studs on connector block.

12-57. LANDING GEAR WARNING HORN SI- LENCER.(U-8D, U-8G, RU-8D)

12-58. The landing gear warning horn silencer is a pushbutton switch used to engage the landing gear warning horn silencer relay. The silencer is mounted in the right side of the instrument panel directly below the carburetor air temperature indicator.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove screws and glare shield from top of instrument panel.

(3) Unscrew mounting nut at rear of landing gear warning horn silencer and pull nut down onto wiring.

(4) Pull silencer through cutout in panel and disconnect wiring from switch.

(5) Remove nut from wiring at rear of instrument panel.

b. Inspection. (1) Inspect terminals for malformed threads and distortion.

(2) Inspect mounting flange and mounting nut or malformed threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install landing gear warning horn silencer mounting nut over associated wiring at rear of instrument panel.

(3) Install silencer through cutout in instrument panel and connect wiring to proper terminals at rear of switch.

(4) Pull mounting nut down over wiring and onto flange of silencer. Tighten nut to secure silencer to instrument panel.

(5) Install glare shield at top of instrument panel and secure with screws.

12-59. HORN SILENCER RELAY.(U-8D, U-8G, RU-8D)

12-60. The horn silencer relay is mounted on a bracket at the back of the instrument panel, adjacent to the landing gear warning horn silencer and landing gear bulb testing switch. When the landing gear warning horn silencer is depressed, the relay is actuated and power to the landing gear warning horn is interrupted. When the silencer is released, the relay remains energized through a set of its own contacts until the throttle is advanced, the landing gear is lowered, or the battery or master switches are placed in the OFF position.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove screws and glare shield from top of instrument panel.

(3) Remove attaching hardware and horn silencer relay.

(4) Tag and disconnect wiring from relay. Remove relay.

b. Inspection. (1) Inspect horn silencer relay case for dents and cracks.

(2) Inspect terminal lugs for distortion and stripped threads.

(3) Inspect terminal screws and mounting screws for malformed threads and corrosion.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to horn silencer relay.

(3) Install relay and secure with attaching hardware.

(4) Install glare shield to top of instrument panel and secure with attaching screws.

12-61. LANDING GEAR CONTROL LAMP TEST SWITCH.(U-8D, U-8G, RU-8D)

12-62. The landing gear control lamp test switch provides a means to check the illumination of the handle on the landing gear control. The U-8D, U-8G test switch is mounted on the upper right side, and the RU-8D test switch is mounted on the lower left side of the instrument panel.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove attaching screws and glare shield from top of instrument panel.

(3) Unscrew mounting nut at rear of landing gear control lamp test switch and pull nut down onto wiring.

(4) Pull test switch through cutout in panel and disconnect wiring from test switch.

(5) Remove nut from wiring at rear of instrument panel.

b. Inspection. (1) Inspect test switch terminals for malformed threads and distortion.

(2) Inspect mounting flange and mounting nut for malformed threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install landing gear control lamp test switch mounting nut over associated wiring at rear of instrument panel.

(3) Install test switch through cutout in instrument panel and connect wiring to proper terminals at rear of switch.

(4) Pull mounting nut down over wiring and onto flange of test switch. Tighten nut to secure test switch to instrument panel.

(5) Install glare shield at top of instrument panel and secure with screws.

12-63. LANDING GEAR DOWN INDICATING SYSTEM.(U-8D, U-8G, RU-8D)

12-64. The position of the landing gear is indicated by three individual indicator lights on the right subpanel, adjacent to the landing gear handle. The indicator lights receiver power through a 3-ampere circuit breaker on the right subpanel. The indicator lights are illuminated at all times the landing gear is down and locked; the ground circuit being completed through the down lock switches. The position light power circuit is wired through one pole of the navigation light switch. When the navigation light switch is turned off, full current is direct to the indicator lights. When the navigation light switch is turned on, the circuit is by-passed through a dimming resistor to prevent excessive brightness for night flying. Refer to paragraph 12-235 for the indicator lights maintenance instructions, and paragraph 12-51 for limit switches maintenance instructions.

12-64A. LANDING GEAR SAFETY SWITCHES.(U-8D, U-8G, RU-8D)

12-64B. The landing gear safety switch which is mounted on the right main gear shock strut contains two micro switches, the landing gear

(retraction) safety switch and the fuselage safety switch. The landing gear safety switch mounted on the left main gear shock strut contains the landing gear warning switch. The landing gear (retraction) safety switch prevents landing gear retraction while the weight of the aircraft is on the shock struts. The fuselage step safety switch prevents the fuselage step from extending if the right hand engine is shut down during flight. The landing gear warning switch causes the horn to sound and warning light in the control handle to illuminate if the landing gear control switch is placed in the gear up position and the weight of the aircraft is on the shock struts. The landing gear safety switches require no maintenance applicable to organizational level maintenance.

12-65. LANDING GEAR ELECTRICAL SYSTEM. (U-8F)

12-66. The landing gear is retracted and extended by a single dc motor operating through a system of jackscrew actuators, drive shafts, drive chains, and gears. The mechanical portion of the landing gear is described in paragraphs 4-255 through 4-317. The electrical system also includes gear-up warning circuits, landing gear position indicators, and safety switches. A two-position switch, mechanically actuated by the landing gear handle, controls the landing gear

retraction and extension circuits. Up and down limit switches open the control relay circuits when the landing gear reaches the fully retracted or extended position. (See figure 12-6.) The switches are actuated by a jackscrew actuator on the landing gear shaft beneath the forward cabin floor panels. A safety switch on the right main landing gear prevents the gear retraction circuits from being energized while the strut is compressed. The switch is actuated by a lever on the landing gear torque knee. A 50-ampere, push-to-reset circuit breaker on the floor in front of the pilot's seats protects the motor power circuits from over-loads. The control relay circuits are protected by a 5-ampere push-pull circuit breaker on the right instrument subpanel. When the landing gear handle

is placed in the GEAR UP position, the control switch energizes the control relay through the up limit switch and the safety switch. The relay closes and completes the power circuit to the up windings of the landing gear motor. When the landing gear handle is placed in the GEAR-DOWN position, the relay is energized through the down limit switch. The relay closes and completes the power circuit to the down windings in the landing gear motor. The control relay dynamically brakes the motor to prevent overtravel of the gear by completing a ground circuit through the armature and field windings when the control circuit is opened by either of the limit switches. For troubleshooting procedures for the landing gear electrical system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Landing gear will not retract or lower.	Landing gear relay circuit breaker disengaged.	Reset circuit breaker.
	Landing gear motor circuit breaker disengaged.	Reset circuit breaker.
	Loose motor ground connection.	Clean and tighten connection.
	Open circuit.	Check continuity of following circuits: circuit breaker bus bar to relay circuit breaker, relay circuit breaker to landing gear control switch, main belly terminal post to motor circuit breaker, and motor circuit breaker to terminal 3 of control relay.
	Defective landing gear control switch.	Replace switch. (Refer to paragraph 12-17.)
Landing gear will lower but not retract.	Defective landing gear control relay.	Replace relay. (Refer to paragraph 12-69.)
	Open circuit.	Check continuity of following circuits: landing gear control switch to safety switch, safety switch to up limit switch, up limit switch to terminal C ₁ of control relay, and terminal 1 of control relay to retract motor.
	Defective limit switch.	Notify direct support maintenance.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Landing gear will retract but not lower.	Defective landing gear control relay.	Replace relay. (Refer to paragraph 12-69.)
	Defective safety switch.	Replace switch. (Refer to paragraph 12-97.)
	Landing gear motor up windings defected.	Notify direct support maintenance.
	Open circuit.	Check continuity of following circuits: landing gear control switch to down limit switch, down limit switch to terminal C2 of control relay, and terminal 2 of control relay to retract motor.
	Defective control switch.	Replace switch. (Refer to paragraph 12-17.)
	Defective limit switch.	Notify direct support maintenance.
Relay circuit breaker trips in both landing gear switch positions.	Defective landing gear control relay.	Replace relay. (Refer to paragraph 12-69.)
	Landing gear motor down windings defective.	Notify direct support maintenance.
Relay circuit breaker trips when both landing gear switch positions.	Grounded circuit.	Test for grounds in the circuit between relay circuit breaker and control switch.
Relay circuit breaker trips when landing gear control handle is in UP position only.	Grounded circuit.	Test for grounds in following circuits: control switch to safety switch, safety switch to up limit switch, and up limit switch to control relay.
Relay circuit breaker trips when landing gear control handle is in DOWN position only.	Grounded circuit.	Test for grounds in following circuits: control switch to down limit switch, and down limit switch to terminal C2 of control relay.
Motor circuit breaker tripping.	Grounded circuit.	Test for grounds in following circuits: circuit breaker to control relay and control relay to retract motor.
	Mechanical defect in gear causing overload.	Check system for binding interference, etc.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Landing gear motor fails to shut off when gear is retracted or gear does not completely retract.	Limit switch out of adjustment.	Notify direct support maintenance.
	Defective limit switches.	Notify direct support maintenance.
Landing gear motor fails to shut off when gear is extended or gear fails to completely extend.	Limit switch out of adjustment.	Notify direct support maintenance.
	Defective limit switch.	Notify direct support maintenance.
Warning horn inoperative in all phases of operation.	Defective horn silencer relay.	Replace relay. (Refer to paragraph 12-59.)
	Defective landing gear warning horn silencer.	Replace silencer. (Refer to paragraph 12-59.)
	Open circuit.	Check continuity between circuit breaker and warning horn, between warning horn and silencing relay, and between silencing relay and throttle switches.
	Grounded circuit.	Check for ground between relay and silencing switch.
	Defective warning horn.	Replace warning horn. (Refer to paragraph 12-79.)
	Open circuit.	Check continuity between relay and landing gear control switch, and between landing gear control switch and safety switch.
	Poor ground at landing gear control switch.	Clean and tighten connection.
Warning horn inoperative when landing gear control handle is in UP position and weight of aircraft is on struts, but operates when a throttle is closed and the gear is up.	Defective landing gear control switch.	Replace switch. (Refer to paragraph 12-17.)
	Defective safety switch.	Replace switch. (Refer to paragraph 12-97.)
	Safety switch out of adjustment.	Readjust safety switch. (Refer to paragraph 12-97.)
	Landing gear warning horn switches out of adjustment.	Readjust switch. (Refer to paragraph 12-49.)
	Defective landing gear warning horn switch.	Replace switch. (Refer to paragraph 12-49.)
Warning horn inoperative when throttle is closed and landing gear is up, but operates when weight of aircraft is on struts and control handle is UP.		

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Warning horn fails to shut off.	Open circuit.	Check continuity of circuit between right throttle switch and terminal 1 of pedestal terminal strip.
	One or more limit switches out of adjustment.	Notify direct support maintenance.
	Defective limit switch.	Notify direct support maintenance.
	Grounded circuit.	Test for grounds in following circuits: warning horn to silencing relay, silencing relay to throttle switches, right throttle switch to down lock switches, safety switch to landing gear control switch (when weight of airplane is on strut), and landing gear control switch to silencing relay.
Warning light inoperative.	Defective landing gear control switch.	Replace landing control switch. (Refer to paragraph 12-17.)
	Open circuit.	Check continuity in following circuits: landing gear relay circuit breaker to light assembly, light assembly to test switch, test switch to landing gear control switch, landing gear control switch to throttle switches, throttle switches to down lock switches, and control switch to up lock switches.
	Defective lamp.	Replace lamp. (See figure 12-11.)
	Defective light.	Replace light. (Refer to paragraph 12-235.)
	Up lock switches out of adjustment.	Notify direct support maintenance.
	Defective up lock switch.	Notify direct support maintenance.
	Defective landing gear control switch.	Replace switch. (Refer to paragraph 12-17.)
	Defective down lock switch.	Notify direct support maintenance.
	Down lock switch out of adjustment.	Notify direct support maintenance.

12-67. LANDING GEAR MOTOR.(U-8F)

12-68. The landing gear retract system is driven by a reversible dc motor attached to a gearbox. The motor and gearbox drives the cross-shafts which retract and extend the landing gears. At the same time it operates the up and down limit switch actuators. The assembly is mounted to the main spar beneath the forward cabin floor panels. The landing gear motor requires no maintenance applicable to organizational level maintenance.

**12-69. LANDING GEAR CONTROL RELAY.
(U-8F)**

12-70. The landing gear control relay is located beneath the forward cabin floor panels beside the landing gear motor. It energizes through the landing gear control switch and up and down limit switches, and provides power to the landing gear motor through the 50-ampere circuit breaker. It also dynamically brakes the motor to prevent overtravel of the landing gear.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove forward passenger seats in accordance with paragraph 4-190.

(3) Remove seat tracks and carpeting from floor panels between the compartment divider and main spar by removing attaching hardware.

(4) Remove forward cabin floor panels in accordance with paragraph 4-207.

(5) Disconnect wiring from landing gear control relay. Tag wiring to facilitate proper installation.

(6) Remove mounting bolts and landing gear control relay.

b. Inspection. (1) Inspect terminals and attaching hardware for malformed threads and corrosion.

(2) Inspect wiring for fraying and deterioration of insulation.

(3) Inspect relay case for cracks and elongated mounting holes.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install relay on bracket and secure with mounting bolts.

(3) Remove tags and install wiring to proper terminals.

(4) Install forward cabin floor panels in accordance with paragraph 4-207.

(5) Install carpeting and seat tracks and secure with attaching hardware.

(6) Install forward passenger seats in accordance with paragraph 4-190.

**12-71. LANDING GEAR CONTROL SWITCH.
(U-8F)**

12-72. The landing gear control switch is a four pole two position switch mounted in the sub-panel and operated with the landing gear control handle. The switch provides power for energizing the control relay. The circuits for the position indicators and the safety switch circuit of the warning horn are routed through the control switch. The control handle fits into a slot at each extremity of its travel and must be pulled out before its position can be changed. A light in the handle illuminates at any time the position of the handle does not correspond to the position of the landing gear. For maintenance instructions, refer to paragraph 12-17.

**12-73. LANDING GEAR WARNING
SYSTEM. (U-8F)**

12-74. The landing gear warning system consists of a warning light in the control handle, a warning horn, a flasher unit, two throttle switches, silencer relay, and a silencer button. The flasher and resistor unit causes the horn to sound intermittently so that it may be distinguished from the continuous sound of the stall warning horn. The landing gear warning circuits are wired through the throttle switches to the down lock switches on each gear. If either throttle is retarded below 16 inches manifold pressure while the gear is not completely locked in DOWN position, the light in the control handle will illuminate and the warning horn will sound. The warning horn can be silenced by pressing the silencer button on the instrument panel. The horn will remain silenced until both throttles are advanced and one or both retarded again below 16 inches manifold pressure or the battery or master switches are placed in the OFF position, or until the landing gear is lowered. A 5-ampere circuit breaker on the right-hand subpanel protects the warning horn circuit. The horn circuit is also wired through the safety switch on the right-hand main gear strut. If the landing gear control handle is moved to the GEAR-UP position while the aircraft is on the ground, the safety switch will complete a ground circuit through the control switch and the horn will sound. In addition, the warning light illuminates the control handle when the position of the handle does not correspond to the position of the gear. The lamp can be tested by pressing the test button on the instrument panel.

12-75. LANDING GEAR WARNING HORN SWITCHES.(U-8F)

12-76. The landing gear warning horn switches are single pole microswitches mounted to a bracket in the engine control pedestal. Each switch is operated by a mechanical actuator attached to each engine throttle lever. For maintenance instructions refer to paragraph 12-49.

12-77. LANDING GEAR LIMIT SWITCHES. (U-8F)

12-78. The landing gear limit switches are located beneath the right hand forward cabin floor panel near the landing gear motor. The switches are operated by a jackscrew actuator driven by the landing gear motor. The landing gear limit switches require no maintenance for organizational level personnel.

12-79. LANDING GEAR WARNING HORN. (U-8F)

12-80. The landing gear warning horn is mounted on the access door behind the instrument subpanel on the left side. The warning horn operates to warn the pilot that the landing gear is not in the DOWN LOCK position when either throttle is retarded.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove access door, located behind left side of instrument subpanel by removing attaching screws.

(3) Remove screws and nuts, and detach landing gear warning horn from subpanel access door.

(4) Disconnect wiring from horn.

b. Inspection. (1) Inspect terminals for distortion, malformed threads and corrosion.

(2) Inspect for elongated mounting holes, cracks, and corrosion on body of horn.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to proper terminals on landing gear warning horn.

(3) Install horn on subpanel access door and secure with screws and nuts.

(4) Install access door at rear of instrument subpanel and secure with attaching screws.

12-81. LANDING GEAR WARNING HORN FLASHER.(U-8F)

12-82. The landing gear warning horn flasher is mounted adjacent to the landing gear warning horn on the access door at the left side of the instrument subpanel. The flasher causes the landing gear warning horn to sound intermittently so that it may be distinguished from the stall warning horn.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove access door behind left subpanel by removing attaching screws.

(3) Slip flasher unit from studs on the connector block.

(4) Remove screws, nuts, and washers which secure connector block and resistor to access door.

(5) Disconnect wiring from connector block.

b. Inspection. (1) Inspect flasher unit for cracked body and corroded terminals.

(2) Inspect mounting studs for damage and security. Make sure mounting studs retain flasher unit securely.

(3) Inspect connector block for security of terminals, cracks, and elongated mounting holes. Inspect terminals for malformed threads and distortion.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to connector block.

(3) Mount connector block and resistor to left subpanel access door. Secure with screws, nuts, and washers.

(4) Snap flasher unit onto studs on connector block.

(5) Position access door on back of left subpanel and secure with attaching screws.

12-84. LANDING GEAR WARNING HORN SILENCER.(U-8F)

12-84. The landing gear warning horn silencer is a normally open pushbutton switch used to engage the landing gear warning horn silencer relay. The silencer is mounted on the upper right side of the instrument panel. For maintenance instructions, refer to paragraph 12-57.

12-85. HORN SILENCER RELAY.(U-8F)

12-86. The horn silencer relay is mounted on the access door behind the extreme left side of the

instrument subpanel, immediately above the flasher unit. For a complete description and maintenance instructions, refer to paragraph 12-59.

12-87. LANDING GEAR CONTROL LAMP TEST SWITCH. (U-8F)

12-88. Refer to paragraph 12-61.

12-89. LANDING GEAR POSITION INDICATOR SYSTEM. (U-8F)

12-90. The position of each landing gear is in-

dicated by three windowed indicators mounted in the center section of the instrument subpanel. With landing gear down and locked, a small wheel is shown. The word UP appears when the gear is in the full UP position. Red stripes indicate the landing gear is not in the position corresponding to the landing gear control handle, or indicate electrical power failure in the landing gear system. The indicators operate through the up and down lock switches on each gear drag brace and in the wheel wells. For troubleshooting procedures for the landing gear position indicator system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
All landing gear position indicators inoperative.	Circuit breaker tripped.	Reset circuit breaker.
	Open circuit between circuit breaker and indicators.	Check wiring continuity. Repair or replace defective wiring.
One landing gear position indicator inoperative.	Defective indicator.	Replace indicator. (Refer to paragraph 12-91.)
One side of landing gear position indicator inoperative.	Defective indicator.	Replace indicator. (Refer to paragraph 12-91.)
	Defective up or down lock switch.	Notify direct support maintenance.
	Open circuit between indicator and switch.	Check continuity of circuit. Repair or replace defective wiring.

12-91. LANDING GEAR POSITION INDICATORS. (U-8F)

12-92. The landing gear position indicators are mounted on the center section of the instrument subpanel and give the pilot a ready indication of the position of each individual landing gear.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove lamp holders and lamps from edge lights on subpanel.

(3) Remove switch covers and rotary switch knobs. Remove edge-lighted panel.

(4) Remove screws securing indicator to subpanel.

(5) Remove indicator from rear of subpanel and disconnect wiring.

b. Inspection. (1) Inspect landing gear position indicator case for dents and glass for cracks.

(2) Inspect terminals at rear of case for malformed threads, distortion, and corrosion.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to proper terminals on indicator.

(3) Position indicator in subpanel and install screws.

(4) Position edge-lighted panel on subpanel and install lamps and lamp holders.

(5) Install switch covers and rotary switch knobs.

12-93. LANDING GEAR UP LOCK SWITCHES. (U-8F)

12-94. The landing gear up lock switches are mounted to a bracket in the top of each wheel

well. The switches are part of the landing gear warning light circuit and are also connected to the position indicator circuit. The switches are activated when the gears are in the full retracted position. The landing gear up lock switches require no maintenance applicable to organizational level maintenance.

12-95. LANDING GEAR DOWN LOCK SWITCHES. (U-8F)

12-96. The landing gear down lock switches are mounted to the drag brace of each landing gear. Two switches are mounted on each strut. One set of switches is connected to the position indicator and warning light circuits, and the second set of switches is connected to the warning horn circuit. The landing gear down lock switches require no maintenance applicable to organizational level maintenance.

12-97. LANDING GEAR SAFETY SWITCH. (U-8F)

12-98. The landing gear safety switch which is mounted on the right main shock strut contains two micro switches, the landing gear (retraction) safety switch, and one micro switch used as the landing gear warning switch and heater-blower safety switch. The landing (retraction) safety switch prevents landing gear retraction while weight of the aircraft is on the shock struts. The landing gear warning switch causes the horn to sound if the landing gear control switch is placed in the gear up position and the aircraft weight is on the struts, and also completes the circuit for the heater-blower.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Mark a line on lower shock of right main landing gear strut and on landing gear safety switch to enable proper alignment on installation.

(3) At right landing gear, remove bolt through safety switch mounting bracket at lower shock strut and detach switch from strut.

(4) Remove nuts, washers, and screws securing cover to box. Remove cover.

(5) Remove nuts, washers, and screws securing switch to box.

(6) Disconnect wiring from switch.

d. Inspection. (1) Inspect terminals and attaching hardware for distortion, malformed threads, and corrosion.

(2) Operate switch by hand and observe for proper toggle action as actuator is depressed and released.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to switch.

(3) Position switch in box and install attaching screws, washers, and nuts.

NOTE

The center screw is installed with screw head next to shock strut and outside screw head inside box.

(4) Place cover on box and install attaching screws, washers, and nuts.

(5) Position switch box on shock strut, align scribed lines and replace bracket bolt.

(6) Adjust switch as outlined in paragraph d below.

d. Adjustment. (1) Jack the aircraft in accordance with paragraph 1-93.

(2) Place jack under shock strut fitted with switch and raise strut until shock strut is compressed 1/2-inch.

(3) Mark a vertical line on switch mounting clamp and strut for use as a reference in repositioning clamp.

CAUTION

During retraction, clearance between the switch and nacelle is critical.

(4) Loosen switch mounting clamp. Adjust switch to a position where actuator barely clicks switch and secure clamp. Make certain reference marks align.

(5) Raise jack then lower it carefully to point where the switch clicks again.

(6) Mark position of shock strut and remove jack. Mark should indicate 1/2-inch extension of strut plus or minus 1/8-inch.

(7) Apply power to the aircraft.

(8) Test landing gear safety switch and warning system prior to lowering aircraft from jacks by depressing landing gear safety switch on right landing gear strut and placing landing gear control handle in GEAR-UP position. Warning horn should sound and light in control handle should illuminate.

12-99. WING FLAP ELECTRICAL SYSTEM.
(U-8D, U-8G, RU-8D)

12-100. The four individual flaps are operated by jackscrew actuators connected to a single

motor and gearbox assembly with flexible drive shafts. Electrical power to the motor is controlled by a three-position lever on the left-hand subpanel. Microswitches on the right inboard flap track serve as flap travel limit switches

and also complete the circuits to the position indicator lights on the subpanel. The circuit to the flap motor is protected by a 15-ampere push-pull type circuit breaker on the right sub-

panel. The indicator light circuit is protected by a 3-ampere push-pull type circuit breaker. For troubleshooting procedures for the wing flap electrical system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Flaps fail to extend or retract.	Circuit breaker disengaged.	Engage circuit breaker.
	Open circuit.	Check wiring and connections.
	Defective flap drive motor.	Replace motor (Refer to paragraph 9-61.)
	Defective flap motor control switch.	Replace control switch. (Refer to paragraph 12-17.)
	Defective flap limit switch.	Replace defective flap limit switch. (Refer to paragraph 12-105.)
One flap position indicator inoperative.	Bulb burned out.	Replace bulb. (See figure 12-16.)
	Flap position indicator switch out of adjustment.	Readjust flap position indicator switch. (Refer to paragraph 9-57.)
Indicator lights do not agree with the position of the flaps.	Wiring improperly connected.	Check and correct improper connections.

12-101. FLAP DRIVE MOTOR.(U-8D, U-8G, RU-8D)

12-102. The flap drive motor is a reversible dc motor attached to a gearbox with four external drives. Flexible drive shafts from the gearbox operate jackscrew actuators which extend and retract the flaps. The upper driveshafts operate the outboard flaps and the lower driveshafts operate the inboard flaps. The motor is mounted to the aircraft structure beneath the rear cabin seat with the driveshafts extending outboard into the wing trailing edges. For maintenance instructions, refer to paragraph 9-47.

12-103. FLAP MOTOR CONTROL SWITCH. (U-8D, U-8G, RU-8D)

12-104. Power to the flap motor is controlled by a three-position toggle switch actuated by a lever on the left subpanel. The switch may be left in either the UP or DOWN position. When lowering the flaps for takeoff, it must be manually returned to the OFF position when the 20 de-

gree down light comes on. For maintenance instructions, refer to paragraph 12-235.

12-105. FLAP LIMIT AND POSITION INDICATOR SWITCHES. (U-8D, U-8G, RU-8D)

12-106. Three microswitches with roller-type actuators on the right hand inboard flap track serve as position indicator and limit switches for the flap system. The switch at the forward inboard end of the track limits the up travel of the flaps and completes the circuit to the UP indicator light on the subpanel. The switch at the inboard end of the track limits the down travel of the flaps and completes the circuit to the DOWN 30° indicator light. The switch on the outboard side of the track is adjusted to complete the circuit to the DOWN 20° indicator light when the flap is in proper position for takeoff.

a. Removal. (1) Lower flaps to DOWN 30° position.

(2) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

of shafts operate the inboard flaps. The motor is mounted vertically in a bracket attached to the forward side of the rear spar beneath the center cabin floor board. The motor is mounted with the gearbox up and the driveshafts extend outboard into the wing trailing edges. For maintenance instructions, refer to paragraph 9-47.

12-113. FLAP CONTROL RELAY. (U-8F)

12-114. The flap control relay is used to prevent the coasting of flaps after power shutoff by shorting the field windings of the motor. The relay is mounted on the outboard side of the right-hand seat deck riser just forward of the rear spar.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove carpeting at outboard side of deck riser, just forward of right hand seat.

(3) Tag and remove wiring from flap motor braking relay.

(4) Remove attaching hardware and relay.

b. Inspection. (1) Inspect terminal nuts, mounting hardware, and electrical terminals for malformed threads and corrosion.

(2) Inspect relay case for cracks and elongated mounting holes.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install relay and secure with attaching hardware.

(3) Remove tags and install wiring to proper terminals on relay.

(4) Install carpeting.

12-115. FLAP MOTOR CONTROL SWITCH. (U-8F)

12-116. The flap motor control switch is a three position toggle switch mounted to a bracket forward of the instrument subpanel. The switch is actuated by a control lever extending through the instrument subpanel and actuates the necessary windings of the reversible dc flap motor to raise or lower the flaps.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove door from back of subpanel by removing screws.

(3) Remove screws attaching switch to mounting bracket and remove switch.

(4) Tag and disconnect wiring.

b. Inspection. (1) Inspect terminals for security. Inspect terminal screws for malformed threads, and corrosion.

(2) Inspect switch case for cracks and chipping.

(3) Inspect switch shank for distortion and malformed threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove tags and connect wiring to switch.

(3) Install switch in mounting bracket and secure with screws.

(4) Install door on back of subpanel and secure with screws.

12-117. FLAP LIMIT SWITCHES. (U-8F)

12-118. The flap limit switches are mounted to the right inboard flap track. The switches are used to limit flap travel at both extremes of the track. For maintenance instructions, refer to paragraph 12-105.

12-119. FLAP POSITION INDICATOR SYSTEM. (U-8F)

12-120. The flap position indicator system is used to give the pilot a ready indication of flap position in percentage of full flap extension. The system consists of the flap position indicator, located on the instrument subpanel center section, and the position transmitter, located in the right wing trailing edge adjacent to the flap actuator shaft. For maintenance instructions, refer to paragraph 10-53.

12-121. PITOT HEAD HEATER.

12-122. The pitot head includes an integral 28-volt heater for deicing purposes. The heater is powered by the aircraft dc system. For removal, inspection, and installation procedures refer to paragraph 10-15.

CAUTION

To prevent damage due to overheating, do not operate pitot head heater for more than 1 minute while aircraft is on ground. Check for heat rise by touching pitot head lightly with fingers. Exercise caution when touching pitot tube with fingers as serious burns may result.

a. Troubleshooting. For troubleshooting procedures for the pitot head heater, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
After external power source is connected, PITOT HEAT circuit breaker is engaged, and PITOT HEAT switch is placed in ON position, pitot heater fails to heat.	Circuit breaker tripped.	Check aircraft cables for loose or defective connections or grounds. Reset circuit breaker.
	Switch defective.	Replace switch. (Refer to paragraph 12-17.)
	Open circuit or disconnected ground to heater.	Check cables and connections for continuity. Correct defect.
	Faulty heater.	Replace complete unit incorporating defective heater. (Refer to paragraph 10-15.)

b. Operational check. (1) Engage PITOT HEAT circuit breaker and connect external power source to aircraft.

(2) With a man stationed at pitot head, place PITOT HEAT switch in ON position and determine if pitot head temperature rises.

CAUTION

To prevent damage due to overheating do not place PITOT HEAT switch in ON position for more than 1 minute while aircraft is on ground. Check for heat rise by touching pitot head lightly with fingers. Exercise caution when touching pitot tube with fingers as serious burns may result.

(3) Place PITOT HEAT switch in OFF position and disconnect external power source.

12-123. HEATING, VENTILATING, AND DEFROSTING SYSTEMS.

12-124. The following electrical components of the heating, ventilating, and defrosting system provide manual control and automatic regulation of the respective systems. Refer to Chapter 11 for remaining systems components.

12-125. CABIN TEMPERATURE THERMOSTAT.

12-126. The cabin temperature thermostat is located on the aft cabin bulkhead and is used to automatically turn the heating system on when cabin temperature falls within the setting of the cabin temperature control rheostat.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove attaching hardware and thermostat.

(3) Disconnect wiring from thermostat.

b. Inspection. (1) Inspect wiring for kinks, fraying, broken insulation, and security of terminals.

(2) Inspect body of thermostat for dents and cracks.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to thermostat.

(3) Install thermostat and secure with attaching hardware.

12-127. CABIN TEMPERATURE CONTROL RHEOSTAT.

12-128. The cabin temperature control rheostat is used to set the temperature at which the cabin is maintained by the cabin temperature thermostat. Range of the cabin temperature rheostat is from 2°C to 30°C (35°F to 86°F).

a. Removal. (1) Remove U-8D, U-8G, and RU-8D temperature control rheostat as follows:

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Remove screws securing padded glare shield to instrument panel deck and remove padded glare shield.

(c) Remove retaining screws securing instrument panel to rubber shock mounts.

(d) Pull instrument panel slightly rearward. Tilt top aft to gain access to back of rheostat.

(e) Loosen setscrew securing the control shaft coupling to rheostat shaft.

(f) Remove retainer nut attaching rheostat and toggle switch bracket to support.

(g) Remove retainer nut attaching toggle switch bracket to rheostat. Pull the rheostat from bracket.

(h) Unsolder wiring. Loosen setscrew and remove lever.

(2) Remove U-8F temperature control rheostat as follows:

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Remove screws securing rheostat panel to aircraft ceiling.

(c) Loosen setscrews in rheostat control knob and remove knob.

(d) Remove retainer nut and detach rheostat from panel.

(e) Unsolder wiring.

c. Inspection. (1) Inspect all attaching hardware for malformed threads and corrosion.

(2) Inspect terminals for distortion and corrosion.

(3) Make sure rheostat control shaft turns smoothly and freely.

d. Installation. (1) Install U-8D, U-8G, and RU-8D temperature control rheostat as follows:

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Attach toggle switch actuator lever to rheostat and tighten setscrew. Solder wiring to proper terminals on rheostat.

(c) Place toggle switch bracket on rheostat and install retainer nut.

(d) Place rheostat on rheostat support and install retainer nut.

(e) Insert rheostat shaft into control shaft coupling and install rheostat retainer nut.

(f) Tighten setscrew securing control shaft coupling to rheostat shaft.

(g) Position instrument panel and install retaining screws.

(h) Position padded glare shield above the instrument panel and install screws.

(2) Install U-8F temperature control rheostat as follows:

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Solder wiring to rheostat terminals.

(c) Position rheostat panel and install retainer nut.

(d) Position rheostat panel on cabin ceiling and install screws.

(e) Install control knob and tighten setscrew.

12-129. HEATER TEMPERATURE CONTROL BOX.

12-130. The heater temperature control box is located in the front, right hand corner of the nose equipment compartment. It automatically cycles the heater to maintain the temperature selected with the cockpit or cabin control rheostat.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Open nose equipment compartment door and remove disconnect plug from heater temperature control box.

(3) Remove control box by removing mounting screws.

b. Inspection. (1) Inspect disconnect plug and mating receptacle for signs of arcing and corrosion.

(2) Inspect control box for dents, cracks, and elongated mounting holes.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install control box and secure with mounting screws.

(3) Install disconnect plug to control box and close nose equipment compartment door.

12-131. ANTI-ICING RHEOSTAT SWITCH.

12-132. The anti-icing rheostat switch on the left hand subpanel, (figure 12-7), controls the rate of flow of the anti-icing fluid by varying the speed of the anti-icing pump. As the control knob is rotated clockwise, the rate of flow increases. When operating the system, the control knob should be turned full on for a short time and then reduce to the desired rate of flow.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove edge-lighted panel from instrument subpanel by removing lamp covers and control knobs.

(3) Remove door from the back of subpanel by removing screws.

(4) Remove retainer nut from rheostat and pull rheostat clear to gain access to wiring.

(5) Unsolder wiring and remove rheostat. b. Inspection. (1) Inspect attaching hardware for distortion and malformed threads.

(2) Inspect rheostat terminals for corrosion and distortion. Make sure control shaft turns freely.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to rheostat. Position rheostat in subpanel and install retainer nut.

(3) Position door on back of subpanel and install screws.

(4) Position edge-lighted panel on instrument subpanel and install recessed bulbs and control knobs.

12-133. DEICER ELECTRONIC TIMER.

12-134. The deicer electronic timer is used to control the sequence and duration of inflation cycles of the deicing equipment. The timer is mounted in the nose equipment compartment. For complete information on the deicer system, refer to paragraphs 11-143 through 11-159.

a. Removal. (1) Place battery and generator

master switches in OFF position. Make sure external power source is disconnected.

(2) Remove disconnect plug from timer.

(3) Remove attaching hardware and timer.

b. Inspection. (1) Inspect disconnect plug and mating receptacle for corrosion and signs of arcing.

(2) Inspect timer case for dents, cracks, and elongated mounting holes.

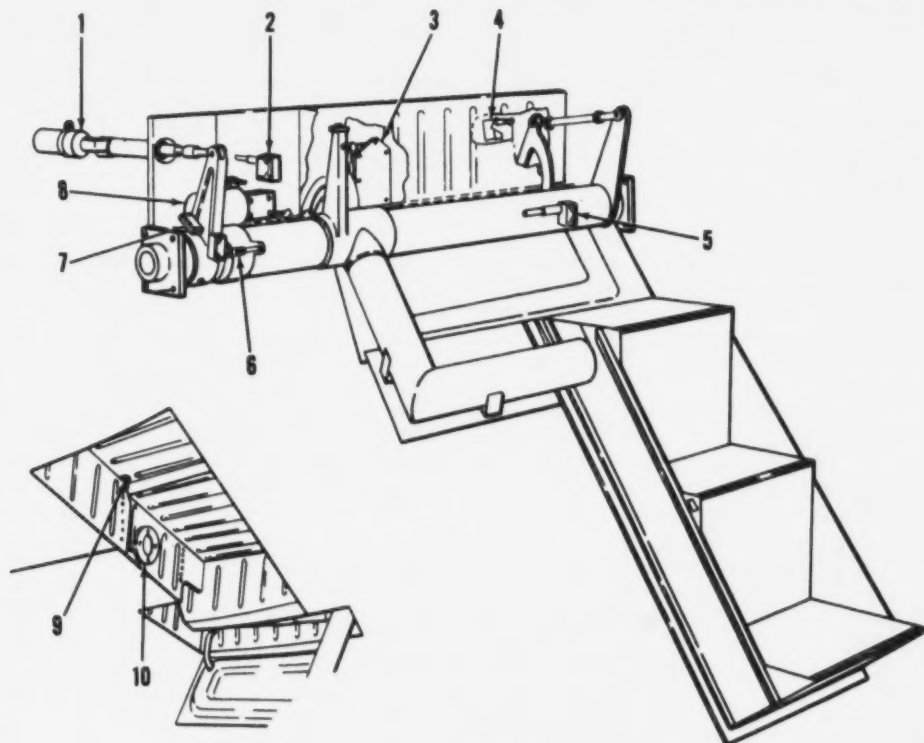
c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install timer and secure with attaching hardware.

(3) Install disconnect plug.

12-135. FUSELAGE STEP SYSTEM. (U-8D)

12-136. The fuselage step is operated by two dc motors functioning in a circuit containing four



1. Step rotation motor
2. Limit switch (down)
3. Step dynamic brake relay

4. Limit switch (warning light)
5. Limit switch (out)
6. Limit switch (in)

7. Safety switch
8. Step slide motor assembly
9. Limit switch (up)
10. Courtesy light

Figure 12-11. Fuselage step electrical components

limit switches, two safety switches, a fuel pressure switch, a key lock switch, and a dynamic brake relay. (See figures 12-11 and 12-12.) One motor rotates the step down from the step well in the bottom of the fuselage, and the other motor slides the step out from under the fuselage into the fully extended position below the right inboard flap. The sequence of operation is reversed to retract the step. The mechanical components of the system are described in paragraph 4-38. The normal operation of the step is automatically controlled by a fuel pressure switch on the forward pilot's compartment bulkhead. The fuel pressure switch energizes the step extension circuits when the right engine is shut down. When the right engine is started, the fuel pressure switch energizes the step retraction circuits. The fuel pressure switch actuates at approximately 5 psi. When the circuits are energized by the fuel pressure switch, the sequence of operations are controlled by limit switches. A safety switch on the right landing gear strut prevents the step from extending if the right engine is shut down during flight. A key lock switch on the side of the fuselage aft of the baggage compartment door permits operation of the step when the aircraft is parked. A warning light on the instrument panel will illum-

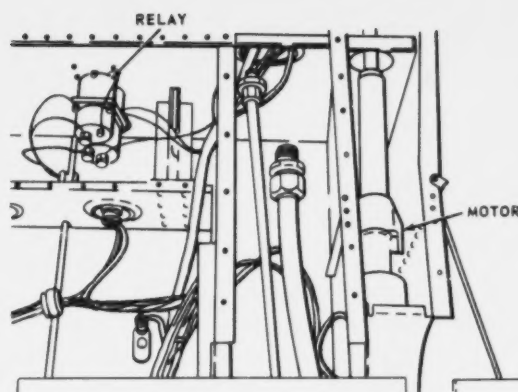


Figure 12-12. Fuselage step motors and relays

inate whenever the step is not fully retracted. The light is operated by a limit switch in the step well. The circuit is protected by a 5-ampere circuit breaker on the right subpanel. A courtesy light in the step well illuminates the step whenever the cabin dome light is on. For troubleshooting procedures for the fuselage step system, proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Step warning light inoperative.	Circuit breaker disengaged.	Inspect for short circuits and engage circuit breaker.
	Lamp burned out.	(See figure 12-16.)
	Limit switch (warning light) inoperative.	Adjust or replace switch. (Refer to paragraph 12-145.)
Step will not slide in when right engine is started.	Defective fuel pressure switch.	Check switch and replace if necessary. (Refer to paragraph 12-143.)
	Circuit breaker tripped.	Check circuit for shorts and reset circuit breaker.
	Defective key lock switch.	Replace switch. (Refer to paragraph 12-147.)
	Step limit switch (in) defective.	Replace switch. (Refer to paragraph 12-145.)
	Loose or broken ground wire on the step dynamic brake relay or motor.	Replace or repair wire as necessary. (Refer to paragraph 12-139 or 12-141.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Step will not retract.	Defective step dynamic brake relay.	Replace relay. (Refer to paragraph 12-141.)
	Defective step slide motor.	Replace motor. (Refer to paragraph 12-137.)
	Chain jammed.	Loosen motor to free chain. Adjust the limit switch (out). (Refer to paragraph 12-137.)
	Chain broken.	Replace chain. (Refer to paragraph 4-38.)
	Step limit switch (in) defective.	Adjust or replace limit switch. (Refer to paragraph 12-145.)
	Defective safety switch.	Replace switch. (Refer to paragraph 12-145.)
	Step doesn't contact safety switch.	Adjust switch. (Refer to paragraph 12-145.)
Step will not extend when right engine is shut down.	Loose or broken ground wire on step rotation motor.	Repair or replace wire.
	Defective step rotation motor.	Replace motor. (Refer to paragraph 12-139.)
	Circuit breaker disengaged.	Check circuit for shorts and engage circuit breaker.
	Defective fuel pressure switch.	Replace switch. (Refer to paragraph 12-143.)
	Defective step key lock selector switch.	Replace switch. (Refer to paragraph 12-147.)
	Defective safety switch.	Notify direct support maintenance.
	Defective step limit switch (down).	Replace limit switch. (Refer to paragraph 12-145.)
Step rotates down but will not slide out.	Loose or broken ground wire on step rotation motor.	Repair or replace wire.
	Defective step rotation motor.	Replace motor. (Refer to paragraph 12-139.)
	Step limit switch (down) inoperative.	Adjust or replace switch as necessary. (Refer to paragraph 12-145.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
	Defective limit switch (out).	Replace limit switch. (Refer to paragraph 12-145.)
	Loose or broken ground wire on step dynamic brake relay or step slide motor.	Repair or replace wires as necessary
	Defective step dynamic brake relay.	Replace relay. (Refer to paragraph 12-141.)
	Defective step slide motor.	Replace motor. (Refer to paragraph 12-137.)
	Chain jammed.	Loosen slide motor to free chain. Adjust limit switch (in). (Refer to paragraph 12-145.)
	Chain broken.	Replace chain. (Refer to paragraph 4-38.)
Step key lock selector switch will not operate step.	Battery master switch turned off.	Turn on battery master switch.
	Defective step key lock switch.	Replace switch. (Refer to paragraph 12-147.)
Step slams hard against stops.	Related limit switches not adjusted properly.	Adjust limit switches. (Refer to paragraph 12-145.)
	Malfunction of step dynamic brake relay (in-out movement only.)	Check for open circuit or loose connection in relay. Replace relay if defective. (Refer to paragraph 12-141.)
Either motor will not shut off.	Related step limit switch inoperative.	Adjust or replace related limit switch. (Refer to paragraph 12-145.)

12-137. STEP SLIDE MOTOR ASSEMBLY. (U-8D)

12-138. The step slide motor assembly (8, figure 12-11) consists of a motor, gear box, and sprocket assembly, mounted to the aircraft structure beneath the cabin floor just aft of the rear spar.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove forward floorboard in baggage compartment and tilt back of rear seat to full forward position.

(3) Disconnect electrical wiring from junction box at right of step slide motor assembly.

(4) From beneath fuselage, disconnect step

slide chain from step supporting casting, route chain around and off sprocket at right of step slide tube and off sprocket on step slide motor assembly.

(5) Remove lockwire and remove bolts fastening step slide motor assembly in fuselage. Lift step slide motor assembly from fuselage.

b. Inspection. (1) Inspect bolts for malformed threads.

(2) Inspect step slide motor assembly for cracked body.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Wire chain on sprocket of step slide motor assembly.

(3) Properly position step slide motor assembly with chain wired around sprocket, replace bolts and lockwire. Route chain through skin to underside of fuselage.

(4) Beneath fuselage, remove wire from chain, keeping tension on ends to keep it on sprocket, and route it around sprocket at right end of slide tube. Attach chain ends to step support casting.

(5) Connect step slide motor assembly electrical wiring to junction box.

(6) Tighten chain to proper tension as outlined in paragraph 4-40.

(7) Replace baggage compartment forward floorboards.

d. Maintenance operational check. (1) Insert battery key in cabin step lock switch and turn clockwise. Steps should extend.

(2) Turn key-operated switch counterclockwise and hold. Steps should retract.

12-139. STEP ROTATION MOTOR.(U-8D)

12-140. The step rotation motor (1, figure 12-11) is mounted to the aircraft structure beneath the floorboard just aft of the rear spar. The step rotation motor is attached to a jackscrew actuator which raises and lowers the step.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove forward floorboard in baggage compartment and tilt back of rear seat to full forward position.

(3) Disconnect electrical wiring from junction box at right of step rotation motor assembly.

(4) Remove bolt which attaches actuator to step retract lever.

(5) Remove lockwire and remove bolts which attach actuator and step rotation motor assembly to fuselage. Remove actuator and step rotation motor assembly.

b. Inspection. (1) Inspect bolts for malformed threads.

(2) Inspect step rotation motor assembly for cracked body.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Properly position step rotation motor assembly and install bolts. Secure bolts with lockwire.

(3) Properly position actuator on step retract lever and install bolt.

(4) Connect electrical wiring at junction box.

(5) Replace baggage compartment forward floorboard.

d. Maintenance operational check. For maintenance operational check refer to paragraph 12-137.

12-141. STEP DYNAMIC BRAKE RELAY (U-8D).

12-142. The step dynamic brake relay (3, figure 12-11) controls power to the step slide motor and also serves as dynamic brake when the step reaches the full extended position by shorting the field windings of the motor.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove attaching hardware and forward floorboard from baggage compartment.

(3) Tag and remove wiring from relay.

(4) Remove mounting bolts and relay.

b. Inspection. (1) Inspect terminal nuts, terminals, and mounting bolts for malformed threads and corrosion.

(2) Inspect relay case for cracks and elongated mounting holes.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install relay and secure with mounting bolts.

(3) Remove tags and install wiring to proper terminals.

(4) Install forward floorboard in baggage compartment.

12-143. FUEL PRESSURE SWITCH.(U-8D)

12-144. The fuel pressure switch (figure 12-13) is connected to the fuel pressure line for the right engine. It controls the step circuits during normal conditions. The step retract circuits are energized when the right engine is started and the extension circuits are energized when the right engine is shut down.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove lockwire from electrical disconnect plug and remove plug from switch.

(3) Provide a suitable container for spilled fuel and a plug for fuel line.

(4) Remove fuel line from switch and plug fuel line.

(5) Remove mounting screws and fuel pressure switch.

b. Inspection. (1) Inspect disconnect plug and receptacle for signs of arcing, corrosion, and malformed threads.

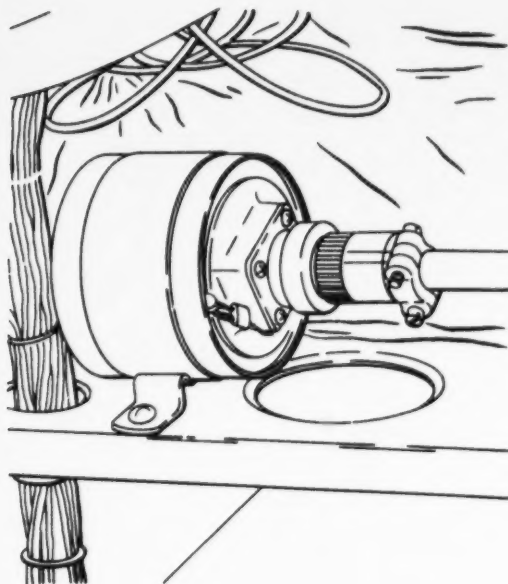


Figure 12-13. Fuel pressure switch

(2) Inspect fuel line and fuel pressure switch fittings for scoring, malformed threads, and any condition which would prevent a liquid tight seal.

(3) Inspect mounting screws for distortion and malformed threads. Inspect fuel pressure switch for elongated mounting holes.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install fuel pressure switch and secure with mounting screws.

(3) Remove plug from fuel line and attach line to fitting on pressure switch.

(4) Install electrical disconnect plug to receptacle on fuel pressure switch and secure with lockwire.

12-145. STEP LIMIT AND SAFETY SWITCHES. (U-8D)

12-146. Mechanical travel of the step is controlled in the various operations by safety and limit switches connected to the step motors electrically and to the fuselage step components mechanically to provide the system with automatic controls to extend and retract the step. (See figure 12-11.)

a. Removal. (1) If retracted, extend the step

fully using the step key lock switch.

(2) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(3) Remove carpeting and floorboard from baggage compartment by removing attaching hardware.

NOTE

Removal of out limit switch does not require removal of floorboard as this switch is installed in step well.

(4) Remove retainer nut from switch and pull switch free.

(5) Remove wiring from switch.

NOTE

Tag or otherwise identify wires before disconnecting them for ease in installation.

b. Inspection. (1) Inspect terminals for distortion, malformed threads, and corrosion. (2) Operate switch by hand and observe for proper toggle action as actuator is depressed and released.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove tags and connect wiring to proper terminals on switch.

(3) Place switch in proper mounting position and install retainer nut.

(4) Adjust switches in accordance with paragraph d below.

(5) Install floorboard and carpeting in baggage compartment and secure with attaching hardware.

d. Adjustment. (1) Connect an external power source to aircraft.

(2) If not previously accomplished, remove carpeting and floorboard from baggage compartment by removing attaching hardware.

(3) Extend step fully if not previously accomplished.

(4) Disconnect wiring to the step rotation motor at disconnect splice.

CAUTION

The in limit and out limit switches must be adjusted before up and down limit switches are adjusted.

(5) Adjust in limit switch to stop step within 0.131 inch of its inboard travel but without

bumping stop. The step retract lever must actuate the up safety switch.

NOTE

Voltage in power circuits will affect amount of coasting after circuit is opened. Make all adjustments with fully charged batteries or with an external power supply providing 28 volts.

(6) Adjust out limit switch to stop within 0.380 inch of its outboard travel but without bumping stop.

(7) Connect wiring to step rotation motor at disconnect splice.

(8) Adjust down limit switch so step rotation lever contacts down stop switch firmly but without bumping stop (U-8D, U-8G and RU-8D).

(9) Adjust warning light switch so door hinge actuates switch just as the door closes completely. Warning light should come on just as the door opens.

(10) Check operation of step and install floorboard and carpeting. Secure with attaching hardware.

12-147. STEP KEY LOCK SWITCH.(U-8D)

12-148. The step key lock switch is used to retract or extend the step when the aircraft is parked. To retract the step, the switch must be turned and held in the counterclockwise position until the step is fully retracted. To extend the step, the switch is held in the clockwise position long enough to energize the circuit and then released.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Open baggage compartment door and remove setscrew securing shaft of switch to lock mechanism.

(3) Loosen nut on shank of switch and slide nut out on shaft. Remove switch and nut. Remove wiring from switch.

(4) Remove nut from shank of lock. Remove lock and nut.

b. Inspection. (1) Inspect all threaded surfaces for malformed threads and corrosion.

(2) Inspect switch terminals for distortion and corrosion.

(3) Inspect lock for proper key operation. Inspect switch for proper detent action.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position lock in proper position and secure with nut.

(3) Place shaft of switch through mounting hole and install nut on switch shaft. Feed switch shaft into opening at rear of lock.

(4) Install nut on shank of switch. Install setscrew in lock mechanism and tighten to secure switch shaft.

12-149. FUEL SYSTEM.

12-150. The electrical components of the fuel system consist of the following components and their control switches or circuit breakers: fuel boost pumps, crossfeed valve (U-8F), torso tank solenoid valve (U 8F), and the primer solenoid valve.

12-151. FUEL BOOST PUMPS.

12-152. An electrically driven fuel pump is installed in each main fuel cell and the aft inboard auxiliary fuel cell to supply vapor free fuel to the system in case of failure of the engine driven fuel pump. The pumps are controlled by the fuel boost switches on the fuel selector panel. For complete maintenance instructions, refer to paragraph 5-100 for the boost pump and paragraph 12-17 for the control switches.

12-153. CROSSFEED VALVE.(U-8F)

12-154. The crossfeed valve is an electrically operated gate valve. It is controlled by a toggle switch on the fuel selector panel. The crossfeed valve is used to allow fuel from either tank to go to either engine. The valve is located on the forward right side of the left wheel well.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Turn fuel selector valves to OFF position.

(3) At left wheel well, remove disconnect plug from crossfeed valve motor.

(4) Remove fuel lines from valve.

(5) Remove attaching hardware and valve.

(6) Remove switch in accordance with paragraph 12-17.

b. Inspection. (1) Inspect disconnect plug terminals for corrosion and indications of arcing.

(2) Inspect shell and sleeve for malformed threads and distortion.

(3) Inspect valve and fuel line fittings for malformed threads, scoring, or any other condition which would cause leakage.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install valve on mounting bracket in left wheel well and secure with attaching hardware.

(3) Coat all male threaded surfaces of fuel fittings with antiseize compound (item 44, table 1-8).

CAUTION

Do not apply antiseize compound to electrical components.

(4) Install fuel lines to fittings on valve.

(5) Install disconnect plug to valve motor.

(6) Install switch in accordance with paragraph 12-17.

d. Maintenance operational check. (1) Connect an external power source to aircraft.

(2) Operate fuel boost pumps and visually check connections for leaks. No leaks should be visible.

(3) Turn both selector valves to MAIN and start left engine in accordance with TM 55-1510-201-10/5.

WARNING

Engine operation will be accomplished by authorized personnel only.

(4) Open the crossfeed valve and turn the left fuel selector to OFF and operate the engine a few minutes. Left engine should continue to operate normally.

(5) Shut down the left engine in accordance with TM 55-1510-201-10/5 and turn both fuel selector valves to OFF.

(6) Disconnect external power source.

12-155. TORSO TANK SOLENOID VALVE. (U-8F)

12-156. The solenoid valve, controls the flow of fuel from the torso tanks into the crossfeed line, is installed in the torso tank fuel line just forward of the main spar in the left wing center section. A toggle-type circuit breaker switch just aft of the fuel selector panel controls the valve. The electrical receptacle for providing power to the torso tank fuel pumps is mounted on the left main cabin seat deck. The circuit breaker switch energizes the solenoid valve and at the same time provides power to the fuel pumps.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Place fuel selectors in OFF position.

(3) Remove access plate beneath left wing center section, just forward of main spar.

(4) Remove disconnect plug from valve. Disconnect fuel lines from valve. Cap disconnected fuel lines to prevent entry of foreign matter.

(5) Loosen valve mounting clamp and remove valve.

(6) Remove circuit breaker switch in accordance with paragraph 12-17.

b. Inspection. (1) Inspect body of valve for dents and cracks.

(2) Inspect fuel lines for kinks and dents. Inspect fittings on fuel lines and valve for malformed threads, scoring, and other conditions which would prevent a liquid tight seal.

(3) Inspect disconnect plug and receptacle on valve for foreign matter, corrosion, and signs of arcing.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position valve in mounting clamp and tighten clamp.

(3) Remove cap from fuel lines and connect fuel lines to valve.

(4) Connect the disconnect plug to valve.

WARNING

Make sure all spilled fuel is wiped from valve before power is turned on.

(5) Check fuel line connections for leaks and install access plate.

(6) Install circuit breaker switch in accordance with paragraph 12-17.

12-157. PRIMER SOLENOID VALVE.

12-158. The primer solenoid valves are mounted to brackets on the underneath side of each engine. Each valve is a normally closed, electromagnetic plunger-type valve with synthetic rubber seats. Push-button switches on the instrument panel near the starter switches energize the valve to feed raw fuel to the engines for easier starting.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove necessary engine cowling to gain access to primer solenoid valve.

- (3) Disconnect wiring from valve.
- (4) Disconnect fuel lines from valve and plug or cover lines to prevent contamination.
- (5) Remove mounting screws and remove valve from mounting bracket.
- (6) Remove pushbutton switches in accordance with paragraph 12-31.
- b. Inspection. (1) Inspect wiring for loose or defective terminals, fraying, and kinks or breaks in insulation.
- (2) Inspect attaching hardware and electrical terminals for malformed threads and corrosion.
- (3) Inspect valve body for cracks and dents.
- c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.
- (2) Install valve on mounting bracket and secure with mounting screws.
- (3) Connect fuel lines to valve.
- (4) Connect wiring to proper terminals on valve.
- (5) Secure engine cowling.
- (6) Install pushbutton switches in accordance with paragraph 12-31.

pilot with aural indication of an impending stall and consists of a warning horn behind the instrument panel connected to a sensing unit on the leading edge of the left hand outboard wing panel. The sensing unit consists of a microswitch actuated by a detector vane. The detector vane actuates the microswitch when the airflow across the leading edge of the wing approaches a stalling condition. The airspeed at which a stall warning will occur will vary as does the stalling speed itself, with various flight conditions. The sensing unit is set to close the circuit 8 mph above the stalling speed with the gear and flaps up and power off. A heater is provided to prevent icing of the sensing unit.

NOTE

To distinguish the stall warning horn from the landing gear warning horn, the stall warning horn sounds continuously, while the landing gear warning horn sounds intermittently.

12-159. STALL WARNING SYSTEM.

12-160. The stall warning system provides the

For troubleshooting procedures for the stall warning system proceed as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Stall warning system inoperative	Circuit breaker disengaged.	Engage circuit breaker. If circuit breaker persists in disengaging, check for a grounded circuit.
	Open circuit.	Check continuity of circuit from circuit breaker to stall warning horn, stall warning horn to sensing switch, and switch to ground.
	Defective microswitch.	Check microswitch operation.
	Defective stall warning horn.	Check stall warning horn operation. Replace if defective. (Refer to paragraph 12-161.)
Stall warning horn continues to blow.	Circuit grounded between stall warning horn microswitch.	Test for ground. Repair or replace defective wiring.
	Defective microswitch.	Replace microswitch.

12-161. STALL WARNING HORN.

12-162. The stall warning horn, located behind the instrument panel on the left hand side, is actuated by the sensing unit on the leading edge of the left wing.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Tag and disconnect wiring from stall warning horn.

(3) Remove attaching hardware and stall warning horn.

b. Inspection. (1) Inspect terminals for distortion, malformed threads, and corrosion.

(2) Inspect for elongated mounting holes, corrosion, and cracks on body of horn.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install warning horn on mounting bracket and secure with attaching hardware.

(3) Remove tags and install wiring to proper terminals on horn.

12-163. STALL WARNING SENSING UNIT.

12-164. The stall warning sensing unit is mounted in the leading edge of the left outboard panel. The vane of the sensing unit holds the normally closed contacts of the stall warning switch (figure 12-14) open as long as air passage over the leading edge of the wing is sufficient to hold the vane in proper position. As the aircraft approaches stall conditions, the vane allows the switch contacts to close, sounding the stall warning horn.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Scribe a line on vane and cover plate.

(3) Remove screws from cover plate, and remove cover plate and stall warning sensing unit.

(4) Disconnect wiring and remove sensing unit from wing. Separate heating element from sensing unit.

b. Inspection. (1) Inspect wiring for damaged insulation, loose or missing terminals, and fraying.

(2) Inspect sensing unit for foreign matter, dents, cracks, and corrosion.

(3) Inspect terminal hardware and mounting screws for malformed threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install heating element in clamp on sensing

unit. Connect wiring to proper terminals.

(3) Line up scribed line on vane and cover plate, and install and tighten screws at either side of vane.

(4) Install sensing unit in wing and secure with remaining screws.

(5) Test fly aircraft to determine at what indicated airspeed the stall warning horn sounds. Adjust in accordance with paragraph d below if stall warning horn does not sound at 7 to 9 mph above stall speed.

d. Adjustment. (1) Loosen screws located at either side of stall warning unit vane and raise or lower vane as required. Tighten screws.

NOTE

Move the vane up and forward to raise the speed at which stall warning horn will sound. Move vane down and back to lower the speed at which stall warning horn will sound. A movement of 1/16-inch causes a change in indicating speed of approximately 5 mph.

(2) Test fly aircraft to determine if correct indicating speed is obtained.

(3) Repeat steps (1) and (2) above as necessary to obtain correct stall warning indication.

CAUTION

Detector vane is heat treated. Do not attempt to bend the vane to make adjustment. Do not lubricate, dope, paint, or otherwise coat vane with any material. Such action will interfere with proper operation of stall warning sensing unit.

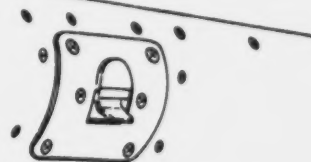


Figure 12-14. Stall warning switch

12-165. BATTERY SYSTEM.

12-166. The battery system consists of two batteries, battery vents, two battery relays, battery switch, and battery master switch on U-8D and U-8G aircraft and one battery, battery vent, battery relay, battery switch and battery master switch on U-8F aircraft.

12-167. BATTERIES (U-8D, U-8G).

12-168. The batteries are 12-volt, 33 ampere-hour capacity, lead acid batteries and are located in the upper outboard section of the engine nacelles. The batteries are connected in series and deliver their combined power to the aircraft. The bus cable, which connects the two batteries, is protected by two relays in the battery system. In addition to the conventional relay in the positive lead of the system, a second relay is placed between the second battery and the common ground, to provide a means of breaking the series connection of the battery in event it becomes grounded. The batteries serve as an emergency source of power and should not be used for starting the engines or servicing equipment if an external power source is available. Unnecessary usage will shorten the life of the batteries and will result in batteries unsuitable for emergency operation. During periods when the engines are idling or being started without an external power source, the electrical load should be kept to a minimum. Service the batteries in accordance with TM 9-6140-200-15, and TB 11-6140-219-35/1.

a. Operational check. (1) Place battery and battery master switches in ON position.

(2) Switch on an electrical unit that receives its power from the aircraft bus bar (landing lights, auxiliary fuel pumps, etc). The electrical unit should operate. This will indicate that the battery relays are working and that the batteries are supplying power to the bus bar.

b. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Open battery access door on upper outboard side of nacelle and disconnect leads from battery terminals. Disconnect NEG terminal first.

(3) Remove battery retaining bolts and hold down blocks.

(4) Lift batteries from the aircraft.

c. Inspection. (1) Inspect threaded parts for malformed threads.

(2) Inspect battery compartments for evidence of electrolyte leakage.

(3) Inspect battery case for cracks and battery terminals for excessive corrosion.

(4) Ensure that drain tubes are clear.

d. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position batteries in the aircraft.

(3) Install battery holddown blocks and retaining bolts.

(4) Connect leads to battery terminals and close battery access door on upper outboard side of nacelle. Connect the POS terminal first.

12-169. BATTERY VENTS (U-8D, U-8G).

12-170. The batteries are cooled by a scoop in the lid of each battery box. All electrolyte that has been spilled or boiled over is drained overboard through a tube in the bottom of the battery box.

12-171. BATTERY RELAYS (U-8D, U-8G).

12-172. A battery relay is mounted in the outboard side of each wheel well, just aft of the starter relay. The 200-ampere, 12 volt, SPDT relays have side mounting brackets and upright terminals. The relays are hermetically sealed units.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect battery leads from the batteries.

(3) Disconnect electrical leads to relays and tag.

(4) Remove mounting bolts and remove relays.

b. Inspection. (1) Inspect electrical terminals for corrosion.

(2) Inspect mounting bracket for distortion and elongated mounting holes.

(3) Inspect battery relays for dents, corrosion, and security of terminals.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position relays in proper position and install mounting bolts.

(3) Connect electrical leads to relays as tagged.

(4) Connect battery leads to batteries.

12-173. BATTERY SWITCH (U-8D, U-8G).

12-174. The battery switch is the key-operated switch located on the engine switch panel. A mechanical linkage attached to the switch locks the magneto switches in the OFF position when the switch is placed in the OFF position. For maintenance of battery switch refer to paragraph 12-19.

12-175. BATTERY MASTER SWITCH (U-8D, U-8G).

12-176. The battery master switch is a single-pole, single-throw toggle switch located on the subpanel at the side of the generator switches. A gang lever mounted above the switch will turn off power from batteries and generators simultaneously in an emergency. For maintenance of battery master switch refer to paragraph 12-17.

12-177. BATTERY (U-8F, RU-8D).

12-178. The battery is a 24-volt, 13 ampere-hour capacity, nickel-cadmium battery located in the upper part of the left hand engine nacelle. The battery is connected to the bus system through a relay located in the left wheel well. A gang lever permits simultaneous cutoff of electrical power from battery and generators in an emergency. General maintenance, servicing and cleaning instructions for airborne NICAD batteries are provided in TM 11-6140-203-14-2.

a. Cleaning. (1) Keep outside of battery, tray and mountings clean.

(2) Clean battery terminals with a nylon bristle brush. (Do not use wire brush). Check for pitting and corrosion.

(3) Check that vent and drain tube is clean and clear of obstructions. Disconnect drain tube and insert small tube in drain tube and blow air through it.

WARNING

Do not place mouth directly to drain tube, as presence of battery electrolyte could be harmful.

(4) Keep battery compartment clean and free of dust and electrolyte. Check compartment each time battery is removed.

b. Operational check. For operational check refer

to paragraph 12-167.

c. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

WARNING

The electrolyte used in nickel-cadmium batteries contains potassium hydroxide (KOH), which is a caustic chemical agent. Serious and deep burns of body tissue will result if the electrolyte comes in contact with the eyes or any part of the body. Use rubber gloves, rubber apron, and protective eye covering when handling the battery. If accidental contact with the electrolyte is made, use ONLY clean water and immediately (seconds count) flush contaminated areas. Continue flushing with large quantities of clean water. Seek medical attention immediately. Before removing or installing the battery, insure that the battery switch is off and the battery has cooled down if overheated. Removal or installation of the battery connector while the battery is under load may result in explosion, electrical arcing and possible severe burns to personnel.

CAUTION

Take every possible step to keep the nickel-cadmium battery as far away as possible from the lead-acid type of battery. Do not use the same tools and materials (screwdrivers, wrenches, gloves, apron, etc.) for both types of batteries. Anything associated with the lead-acid battery, even the air, must never come in contact with the nickel-cadmium battery or its electrolyte. Even a trace of sulfuric acid fumes from a lead-acid battery may result in damage to the nickel-cadmium battery. If sulfuric acid has been inadvertently mixed with the electrolyte in the battery, the upper areas of the cells will appear greenish in color. In such cases, the battery must be replaced.

(2) Remove battery access door from top of left hand engine nacelle.

(3) Disconnect battery connector assembly from terminals.

(4) Remove battery cover and lift battery from the aircraft.

d. Inspection. (1) Inspect threaded parts for malformed threads.

(2) Inspect battery compartment for evidence of acid leakage.

(3) Inspect battery case for cracks and battery terminals for excessive corrosion.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position battery in aircraft and install battery cover.

(3) Connect battery connector assembly to battery terminals.

(4) Install battery access door on top of left hand engine nacelle.

12-179. BATTERY RELAY (U-8F, RU-8D).

12-180. The battery relay is mounted in outboard side of left wheel well, just aft of starter relay. The 200-ampere, 28 volt-SPDT relay has side mounting brackets and upright terminals. The relay is a hermetically sealed unit. For maintenance of battery relay refer to paragraph 12-171.

12-181. BATTERY SWITCH (U-8F, RU-8D).

12-182. The battery switch is the key-operated switch located on the subpanel beside the magneto switches. A mechanical linkage attached to the switch locks the magneto switches in the OFF position when the switch is turned off. For maintenance of battery switch refer to paragraph 12-19.

12-183. BATTERY MASTER SWITCH (U-8F, RU-8D).

12-184. The battery master switch is a single-pole, single-throw toggle switch located on the subpanel beside the generator switches. It is wired in series with the battery switch. A gang lever mounted above the switch will turn off the power from battery and generator simultaneously in an emergency. For maintenance of battery master switch refer to paragraph 12-17.

12-184A. BATTERY MONITOR (RU-8D, U-8F).

12-184B. The battery monitor system senses

battery current and provides a visual indication whenever the charging current exceeds a predetermined amount. The system consists of a shunt, battery monitor circuit board (PCB) detector, caution light, and circuit breaker. The battery monitor system is protected by a ½ Amp circuit breaker.

a. Operational check: Start engine in accordance with TM 55-1510-201-10. The amber battery charge light will illuminate approximately six seconds after initiation of charge following an engine start. This provides a check of the entire system, including the sensor, detector circuit, caution light and many variables. The light will normally extinguish within five minutes, and remain out unless the charge current increases above the predetermined level.

b. Test: Tests using the aircraft loadmeter should be conducted when the light fails to go out to confirm possibility of an unsatisfactory condition.

c. Shutdown engine in accordance with TM 55-1510-201-10.

12-184C. BATTERY CHARGE MONITOR SYSTEM FUNCTIONAL TEST.

1. Partially discharge the aircraft battery by turning on the inverter, radios, etc.

2. Connect external power source to aircraft and set at 28 ± 1 VDC with battery switch OFF.

3. Turn battery switch ON. Observe the BATTERY CHARGE light comes ON (6 second delay). The light should stay on no longer than ten minutes unless the battery is unduly discharged. (Refer to troubleshooting procedures.)

12-184D. SHUNT (RU-8D, U-8F).

12-184E. The shunt is connected in the battery ground lead to sense battery charge current, regardless of source. Shunt signal is applied to the battery charge monitor printed circuit (PC) board. RU-8D shunt is installed in the former lead acid battery box located on the left-hand engine nacelle. U-8F, shunt is installed in the battery box.

NOTE

If RU-8D Aircraft has battery box removed, install shunt, Printed Circuit Board and cover on web (Buttline 88.00) below channel at (Waterline 103.2) centered approximately on Fuselage Station 104.2. Circuit breaker is installed approximately in same location.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power is disconnected.

(2) RU-8D, open former battery access door located at top of left hand engine nacelle.

(3) U-8F, remove battery access door.

(4) Remove printed circuit board (PCB) in accordance with paragraph 12-184F.

(5) Remove mounting nuts and washers, remove shunt.

b. Inspection: Inspect shunts for cracks.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power is disconnected.

(2) Position shunt in proper position, secure with washers and nuts.

(3) Install printed circuit board in accordance with 12-184F.

(4) RU-8D, U-8F, secure battery access door or cover.

12-184F. PRINTED CIRCUIT BOARD (PCB) RU-8D, U-8F.

12-184G. The printed circuit board detects the charge current, after it has exceeded the preselected level and applies voltage to amber battery charge light. RU-8D, the PCB is installed in former lead acid battery box located on the left-hand engine nacelle on RU-8D and converted RU-8D to the U-8D configuration aircraft (See NOTE in paragraph 12-188). U-8F, the PCB is installed in the battery box.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power is disconnected.

(2) RU-8D; Open former battery access door from top of left hand engine nacelle.

(3) U-8F, remove battery access cover.

(4) Remove screws and washers attaching cover to PC board.

(5) Remove screws and washers attaching wires to PC board.

(6) Separate wire socket connectors at PC board.

(7) Remove attaching screws and washers and brass washers under PC board, remove PC board.

b. Inspection. Inspect PC board assembly for damage and defects.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power is disconnected.

(2) Install washer on each screw, insert screws through PC board. Install brass washers on screws under PC board, secure with screws.

(3) Connect wire socket connectors at PC board.

(4) Attach wiring to PC board with lockwasher and screws.

(5) Position PC board cover and secure with washers and screws.

(6) RU-8D, U-8F, secure battery access door or cover.

12-184H. CIRCUIT BREAKER (RU-8D, U-8F).

12-184I. The circuit breaker used in the battery monitor installation is a ½ ampere circuit breaker. The circuit breaker is installed in former lead acid battery box RU-8D and converted RU-8D to U-8 configuration. (See NOTE in paragraph 12-184E). The U-8F circuit breaker is installed in left-hand wheel well. For maintenance on circuit breakers refer to paragraph 12-21.

12-184J. INDICATOR LIGHT (RU-8D, U-8F).

12-184K. The indicator light is a press to test light which provides an amber glow whenever the charge current exceeds predetermined amount. RU-8D light is installed on the instrument panel under the clock. U-8F light is installed on pilot side of instrument panel under and between manifold pressure gauge and tachometer. For maintenance of indicator lights refer to paragraph 12-235.

12-184L. BATTERY CHARGE MONITOR SYSTEM TROUBLESHOOTING.

a. Battery charge light on pilot's instrument inoperative.

(1) Check for defective light bulb with press-to-test switch.

Replace bulb if defective. (Refer to Figure 12-16).

(2) Visually check connections on current detector assembly assembly for looseness or corrosion.

(3) Disconnect current detector connector and jumper between pin 1 and 2 on the aircraft side (instrument panel). With power on the BATTERY CHARGE light, the instrument panel light should illuminate.

Light does not illuminate, go to step 5.

(4) Replace current detector assembly printed circuit board assembly. (Refer to paragraph 12-184F a).

Perform functional test. (Refer to paragraph 12-184C).

(5) If pin 1 of current detector connector has 28 VDC. Use a multimeter to check the instrument circuit.

(6) Perform functional test. (Refer to paragraph 12-184C).

12-185. GENERATOR SYSTEM.

12-186. The generator system consists of two generators, voltage regulators, reverse current relays, circuit breakers, and switches. On the U-8D, U-8G, and RU-8D aircraft the voltage regulators and reverse current relays are mounted in the generator control box beneath the right side

of the instrument panel. On the U-8F aircraft the voltage regulators and reverse current relays are mounted beneath the pilot's compartment center floorboard. The generator output circuit is protected by circuit breakers located on the floorboard at the forward edge of pilot's seat. Troubleshooting procedures for the generator system are as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Zero or low generator output.	Engine speed is too low.	Increase engine speed to above generator cut in speed.
	Loose or wrong connection.	Check all wiring connections.
	Defective generator.	Replace generator. (Refer to paragraph 12-187.)
	Defective reverse current relay.	Replace reverse current relay. (Refer to paragraph 12-191.)
	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)
	Defective voltmeter.	Replace voltmeter. (Refer to paragraph 10-59.)
	Defective generator control switch.	Check and replace if defective. (Refer to paragraph 12-17.)
No generator current output.	Circuit breaker tripped.	Reset circuit breaker.
	Open circuit.	Check circuit continuity.
	Loss of residual magnetism.	Flash generator field. (Refer to paragraph 12-188A.)
	Defective reverse current relay.	Replace reverse current relay. (Refer to paragraph 12-191.)
	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)
	Defective generator.	Replace generator. (Refer to paragraph 12-187.)
	Defective control switch.	Replace control switch. (Refer to paragraph 12-17.)
One generator tends to carry most of the load (Both generators turned on).	Generators not paralleled.	Adjust the voltage regulator and paralleling resistor as described in paragraph 12-189.
	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Ammeter or voltmeter reads off scale in wrong direction.	Instrument connections reversed.	Connect properly.
	Reversed generator polarity.	Flash generator field. (Refer to paragraph 12-188A.)
Ammeter or voltmeter fluctuates excessively.	Loose connection on SW terminal of reverse current relay.	Tighten connection.
	Loose connection or ground in aircraft wiring.	Check wire connections.
	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)
	Defective generator brushes.	Replace generator. (Refer to paragraph 12-187.)
Excessive arcing is present.	Defective brushes or commutator.	Replace generator. (Refer to paragraph 12-187.)
	High voltage; voltage regulator is out of adjustment.	Adjust voltage regulator as described in paragraph 12-189.
	Wrong connections between generator and switch relays.	Check and correct according to the wiring diagrams.
	Short circuit between the cables to the terminals.	Repair or replace as required.
Generator voltage output.	Short circuit between A and B terminals on voltage regulator.	Repair or replace as required.
	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)
Generators will not parallel.	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)
Generator voltage drops excessively when a load is applied.	Defective generator brushes (brushes worn beyond the end of wear groove, located on the side of the brush).	Replace generator. (Refer to paragraph 12-187.)
	Defective voltage regulator.	Replace voltage regulator. (Refer to paragraph 12-189.)

12-187. GENERATORS.

distortion and provide favorable commutation conditions.

12-188. The generators are rated at 30 volts dc, 300 amperes. Interpole and compensating windings are provided in the negative circuit to prevent field

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

- (2) Open the cowling.
- (3) Slide insulators from generator terminals and remove electrical leads from the generators.
- (4) Remove air spout retaining screws and detach air spout from generator and engine baffle on U-8D, U-8G and RU-8D aircraft.

NOTE

On U-8 aircraft remove right rear engine baffle assembly as described in paragraph 5-78. Do not remove generator cooling spout.

- (5) Remove generator attaching nuts and remove generator and gasket.

b. Inspection. (1) Inspect all threaded parts for malformed threads.

(2) Inspect connecting cables for broken or deteriorating insulation.

(3) Inspect external splines of generator drive shaft for wear.

(4) Inspect generator external drive shaft for discoloration.

(5) Inspect armature for binding, rubbing and unusual noises, by turning shaft assembly.

(6) Inspect commutator for loose or missing commutator bars.

(7) Inspect commutator for grooves, pitting and burned commutator bars.

(8) Inspect undercutting of commutator bars.

(9) Inspect generator brushes for wear and freedom of movement.

(10) Inspect terminals for security.

(11) Inspect generator mounting studs for damaged threads or rough edges.

b.1. Replace. (1) Generator if top lands of external drive shaft splines measure 0.005. In order to determine the amount of wear since last installation, measure the top land of each spline tooth along its entire length and compare the smallest dimension with new spline dimension minimum of 0.005, if service records indicate the top land dimension may reach 0.005 during the next service period, the generator should be replaced.

(2) Generator if black discoloration is present on drive shaft.

(3) Generator if armature does not rotate freely by turning shaft assembly by hand.

(4) Generator if commutator bars are loose or missing.

(5) Generator if commutator is grooved, pitted or

burned.

(6) Generator if the undercutting depth between generator bars is less than 1/32 of an inch.

(7) Generator brushes if they exceed brush wear limit. End of wear groove.

(8) Any generator mounting stud which has rough edges or damaged threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position new gasket on engine mounting pad.

(3) Coat generator and accessory drive splines with lubricant (item 82, table 1-8) and position generator on engine mounting pad and secure with appropriate self-locking nuts. Torque nuts to 300 inch-pounds.

NOTE

To assure better generator shaft alignment, install top bolts first.

(4) Install air spout and secure with retaining screws on U-8D, U-8G, and RU-8D aircraft.

NOTE

On U-8F aircraft install right rear engine baffle assembly as described in paragraph 5-78.

(5) Connect electrical leads to generator and slide terminal insulators into place.

(6) Close and fasten engine cowling.

12-188A. GENERATOR FIELD FLASHING.

12-188B. If a generator becomes inoperative and troubleshooting procedures isolate the probable cause as reversed polarity or loss of residual magnetism in the generator's poleshoes, the generator field coils may be flashed as follows:

a. Remove the voltage regulator from the generator circuit to be flashed. Connect one end of a suitable length of cable, 18 gauge or larger, to the generator A terminal on the voltage regulator base.

b. Disconnect the wire from the terminal marked SW on the reverse current relay to prevent possible damage to electrical instruments connected in the system.

c. Turn the generator switch and battery switch

to the ON position.

d. With the engine operating at idle rpm, touch the other end of the cable to the terminal marked BAT on the reverse current relay and hold for one second.

e. Install the voltage regulator and SW wire on the reverse current relay.

f. Run the engine up to cruising rpm and note whether the voltmeter shows a reading.

g. If voltage is not obtained, the generator is faulty and must be replaced. If voltage is obtained temporarily but not maintained, replace the generator.

12-189. VOLTAGE REGULATOR.

12-190. A carbon pile type voltage regulator is provided for each generator to maintain substantially constant generator voltage despite variations in engine speed and load conditions. A variable equalizing resistor in the paralleling circuit of each voltage regulator permits equal sharing of generator loads, after the minimum load voltage has been adjusted with the voltage regulator rheostats.

a. Operational check. For operational check refer to paragraph 12-13.

b. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove generator control box cover on U-8D, U-8G, and RU-8D aircraft.

NOTE

On U-8F aircraft, remove the pilot's compartment carpeting and center floorboard as described in paragraph 4-174 and 4-176 to gain access to the voltage regulators.

(3) Pull voltage regulators from their mounting clips.

c. Inspection. (1) Inspect connections for corrosion or breaks.

(2) Inspect voltage regulator for security of base.

(3) Inspect case for dents or cracks.

d. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Insert voltage regulators in their mounting clips.

(3) Install generator control box cover on U-8D, U-8G, and RU-8D aircraft.

NOTE

On U-8F aircraft, install center floorboard and pilot's compartment carpeting that were removed to gain access to the voltage regulators as detailed in paragraphs 4-174 and 4-176.

e. Adjustment. It is essential that both generators share the electrical load equally to prevent damage to one of the generators, as the generator having the higher output voltage will take all the load. Parallel the generators by means of adjusting screws (6 and 8, figure 12-15) until output voltage of each generator is the same. The paralleling resistors (2 and 4) are then adjusted so that current load of electrical circuits are equally shared by each generator. Paralleling must be done with a suitable precision portable dc voltmeter with a 0- to 30-volt range as follows:

NOTE

Adjustment must be made with voltage regulators at operating temperature. This may be accomplished by adjusting voltage regulators after a thorough ground warm-up or a flight with a load on generators for a period of at least 15 minutes.

(1) Connect the positive probe of a DC voltmeter (preferably the AN/USM-303A or Weston Model 281 or any equivalent voltmeter which has a DC voltage scale accuracy of 1%) to any convenient point on the battery/essential bus and connect the negative probe to a convenient aircraft ground. If a 1% voltmeter is not available, a TS-352/U or equivalent multimeter may be used; however, the regulator should be readjusted using a 1% accurate voltmeter at the earliest possible time.

(2) Start engines in accordance with TM 55-1510-201-10/4 or -10/5.

(3) Advance throttle to 2200 rpm with battery switch in normal ON position, and generator master switches ON.

CAUTION

Watch engine temperature closely during ground operation.

(4) Turn on all communications, navigation, and instruments and check that all circuit breakers are in.

(5) Read and record the voltage on test voltmeter.

(6) Adjust voltage regulator rheostats according to the following chart.

AMBIENT GROUND LEVEL TEMPERATURE (F°C)	VOLTAGE REGULATOR SETTING (VOLTS)
Above 80°F (26°C)	27.0±0.2
Between 32°F & 80°F (0°C & 26°C)	28.0±0.2
Below 32°F (0°C)	28.5±0.2

NOTE

Turn rheostat adjusting screw clockwise to increase voltage; counter-clockwise to decrease voltage.

NOTE

Generator voltages must be set as close as possible to the same voltage.

NOTE

To preclude frequent voltage regulator setting changes, the ambient ground level temperature must be considered as a mean (average) value. For example, if the voltage regulator is checked during the month of December in the northeastern US and the ambient temperature at that time of day is 82°F, it is doubtful if that temperature would be a mean value but rather a daily high; therefore, maintenance personnel must consider the mean at average weekly ambient temperature rather than the ambient temperature on a single day.

(7) Check accuracy of instrument panel voltmeters by checking voltmeter readings when each generator supplies current individually. If readings are the same, the voltmeters are satisfactory.

(8) With both generators ON and with both engines operating at 2200 rpm, adjust taps on

equalizing resistors so there is no more than 10 amperes difference in the two voltmeter readings.

NOTE

To make a generator take more load, move its resistor adjusting tap toward the ground end of resistor. To make it take less load, move tap away from ground end.

(9) Remove all electrical loads from the system and switch off the left generator. Read and record the voltage at the right generator control unit test jacks. Switch off the right generator and switch on the left generator. Read and record the voltage at the left generator test jacks. If the voltage of either generator in the unloader condition varies more than 0.5 volts from the loaded voltage, replace the affected voltage regulator.

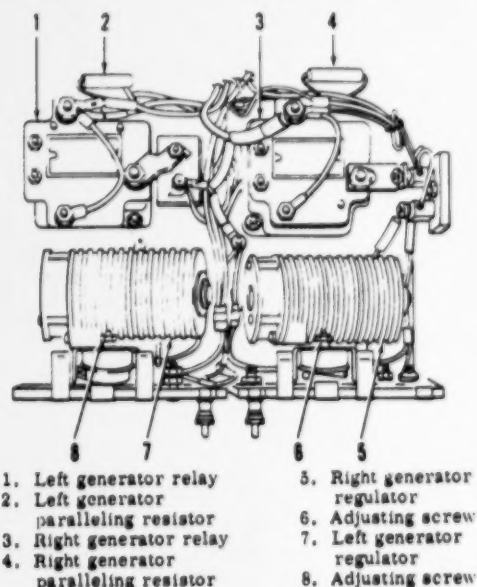


Figure 12-15. Voltage regulators and reverse current relays

12-191. REVERSE CURRENT RELAYS.

12-192. The reverse current relays close when generator voltage reaches 22 to 24-1/2 volts

provided this voltage exceeds battery bus voltage by 0.35 to 0.65 volt and provided generator master switch is ON. Each reverse current relay automatically disconnects its generator from the bus when 16 to 25 amperes of reverse-current are flowing from battery to generator.

a. Operational check. For operational check refer to paragraph 12-13.

b. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove cover from generator control box on U-8D, U-8G and RU-8D aircraft.

NOTE

On U-8F aircraft, remove the pilot's compartment carpeting and center floorboard as described in paragraphs 4-174 and 4-176 to gain access to the reverse current relays.

(3) Disconnect electrical leads and tag.

(4) Remove nuts from reverse current relay mounting studs on U-8D, U-8G, and RU-8D aircraft and remove reverse current relay.

NOTE

On U-8F aircraft remove mounting screws and remove reverse current relay.

c. Inspection. (1) Inspect cover for dents and cracks.

(2) Inspect terminals for corrosion.

d. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position reverse current relays in proper position and secure with nuts on U-8D, U-8G and RU-8D aircraft.

NOTE

On U-8F aircraft install mounting screws.

(3) Connect electrical leads as tagged.

(4) Install cover on generator control box on U-8D, U-8G and RU-8D aircraft.

NOTE

On U-8F aircraft install pilot's compartment center floorboard and carpeting as described in paragraphs 4-174 and 4-176.

12-193. CIRCUIT BREAKERS.

12-194. The circuit breakers for the generators are 200 ampere push-to-reset type circuit breakers. After a circuit breaker has been tripped by an overload condition, it can be reset by pressing the reset button provided it has cooled sufficiently. The circuit breaker contacts cannot be held in the closed position when overload conditions exist.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove pilot's compartment carpeting and floorboard as described in paragraphs 4-174 and 4-176.

(3) Disconnect electrical leads from circuit breaker.

(4) Remove mounting screws and remove circuit breaker.

b. Inspection. (1) Inspect case for dents and cracks.

(2) Inspect terminal lugs for corrosion.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position circuit breaker in proper position and secure with mounting screws.

(3) Connect electrical leads to circuit breaker.

(4) Install pilot's compartment floorboard and carpeting as described in paragraphs 4-174 and 4-176.

12-195. SWITCHES.

12-196. The generators are controlled by two toggle switches located on the right instrument subpanel. For maintenance of switches refer to paragraph 12-19.

SECTION III AUXILIARY POWER SYSTEM

Not Applicable

SECTION IV ALTERNATING CURRENT POWER DISTRIBUTION SYSTEM

12-197. ALTERNATING CURRENT.

12-198. The alternating current system consists of inverters for operating various components within each aircraft. In U-8D aircraft, the inverters operate the attitude indicator, gyrosyn compass indicator, the glide slope receiver, and, where installed, the TACAN and the 26-VAC navigation indicator transformer. The inverters in U-8G aircraft operate the gyro magnetic compass, the gyrosyn compass indicator, the glide slope receiver and its controls, the TACAN and the ID-663 bearing, distance and heading indicators. RU-8D aircraft use inverters to operate the glide slope receiver, the attitude indicator, the ASN-64 doppler, the C12 compass, the 26-VAC compass excitation, and the drift meter excitation. Inverters are used in U-8F aircraft to operate the attitude indicator, gyrosyn compass indicator, glide slope receiver, and, where installed, the TACAN, the 26-VAC navigation indicators transformer and the weather radar. In U-8F aircraft, serial numbers 61-2426 through 61-2430, inverters also supply ac power for the MM-3A attitude indicator.

12-199. INVERTER SYSTEM.

12-200. U-8D AIRCRAFT. The inverter system for U-8D (STD) aircraft consists of two single-phase and two three-phase inverters located in the nose compartment. U-8D (ASAC) aircraft have two single-phase, 750-VA inverters, lo-

cated in the aft fuselage equipment compartment. A phase adapter is required in U-8D (ASAC) aircraft to operate the three-phase equipment.

12-200A. RU-8D AIRCRAFT. The inverter system for RU-8D aircraft consists of two single-phase and two three-phase inverters. The three-phase inverters are mounted in the nose equipment compartment, one single-phase inverter is located on the equipment rack in the passenger/cargo compartment, and the other single-phase inverter is located in the aft fuselage equipment compartment.

12-200B. U-8F AIRCRAFT. The U-8F (STD) aircraft inverter system consists of two single-phase inverters only, one located in the RH nacelle and one in the nose equipment compartment. The inverter system for U-8F (STD) aircraft serial No. 61-2426, 61-2427, and 61-3430 consists of two single-phase inverters and two three-phase inverters. The single-phase inverters on all U-8F (STD) aircraft contain a phase adapter in the circuit to operate the three-phase equipment of the aircraft. The ac power distribution system of U-8F (ASAC) is modified to permit operation of two 750-VA single-phase inverters only.

12-200C. U-8G AIRCRAFT. The inverter system for U-8G aircraft consists of single-phase inverters located in the nose equipment compartment. Troubleshoot the inverter system as follows:

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Both main and standby inverters inoperative.	Open circuit.	Check continuity of circuits between inverter switch and circuit breaker, and between circuit breaker and power source.
	Circuit breaker tripped.	Reset circuit breaker.
	Defective inverter switch.	Replace switch. (Refer to paragraph 12-17.)
One inverter inoperative.	Defective inverter.	Replace inverter. (Refer to paragraphs 12-202 through 12-208).
	Open circuit.	Check continuity of circuits between switch and inoperative inverter.

INDICATION OF TROUBLE	PROBABLE CAUSE	CORRECTIVE ACTION
Inverter indicator light inoperative.	Loose ground connection.	Tighten ground connection.
	Defective lamp.	Replace lamp. (See figure 12-16.)
	Open circuit.	Check continuity in circuits between inverter switch and terminal 3 of the light socket, between terminal 3 of the light socket and the indicator relay, and between the indicator relay and the light socket.
	Loose ground connection.	Tighten ground connection at light socket.
	Defective indicator relay.	Replace relay. (Refer to paragraph 12-213.)

12-201. INVERTERS, (U-8D)

12-202. U-8D (STD). The inverters are powered by the aircraft's dc system. The inverters provide 115-volt alternating current to the attitude indicator, gyrosyn compass indicator, and glide slope receiver. The attitude indicator and gyrosyn compass indicator are powered by either of two three-phase inverters, one main and one standby. Similarly, the glide slope receiver is powered by either the main or the standby single-phase inverter. The inverters are protected by 10-ampere circuit breakers and controlled by switches placarded OFF, MAIN, and STANDBY.

a. Operational check. (1) Connect an external power source to aircraft. Engage single-phase inverter circuit breaker.

(2) Place single-phase inverter switch in MAIN position and observe main inverter. Main inverter should begin operation.

(3) Turn glide slope receiver on and observe glide slope indicator. OFF flag on glide slope indicator should disappear after normal warmup interval.

(4) Place single-phase inverter switch in STANDBY position and observe main and standby single-phase inverters. Main inverter should cease operation and standby inverter should begin operating.

(5) Observe glide slope indicator. OFF flag on glide slope indicator may appear as inverter changeover is made, but should disappear as standby inverter reaches operating speed.

(6) Place single-phase inverter switch in OFF position. OFF flag should appear on glide slope indicator.

(7) Engage three-phase inverter circuit breaker and place three-phase inverter switch in MAIN position. Observe main three-phase inverter. Inverter should begin operating.

(8) Observe attitude indicator. OFF flag should disappear within 2 minutes.

(9) Place three-phase inverter switch in STANDBY position and observe three-phase inverters. Main inverter should cease operation and standby inverter should begin operating.

(10) Observe attitude indicator. OFF flag on attitude indicator may appear as inverter changeover is made but should disappear as standby inverter reaches operating speed.

(11) Place three-phase inverter switch in OFF position. OFF flag should appear in attitude indicator.

(12) Disconnect external power source.

b. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect electrical plug from inverter.

(3) Remove four mounting screws from base of inverter and remove inverter.

c. Cleaning. Wipe exterior of inverter clean with a clean lint-free cloth moistened in dry cleaning solvent (item 6, table 1-8).

d. Inspection. (1) Inspect case for dents and cracks.

(2) Inspect receptacle for corrosion.

e. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Place inverter in proper position and install mounting screws.

(3) Connect electrical plug to inverter.

12-202A. U-8D (ASAC). The inverter system for U-8D (ASAC) consists of two single-phase, 750-VA inverters. The two standard single-phase and the two standard three-phase inverters have been removed. One inverter (MAIN) supplies ac power to the AN/ARN-52 TACAN, the 26-VAC navigation indicator circuit transformer, and Glide Slope Receiver R-746 under normal operation; the main inverter provides power also to the J-8 attitude indicator and the gyromatic compass indicator through a phase adapter. The other inverter (SPARE) performs the same function as the main inverter, should the main inverter fail. Both inverters are controlled by one switch and have a single INVERTER FAIL lamp installed. Both the main inverter and the spare inverter are protected by 60-ampere circuit breakers. Removal, cleaning, and installation procedures are identical to those given for U-8D (STD) aircraft above.

12-203. INVERTERS. (U-8G)

12-204. The U-8G inverters are powered by the aircraft dc system. Two 250 VA, single-phase inverters comprise the primary ac system. A 750 VA, single-phase inverter comprises the auxiliary ac system. The primary system furnishes alternating current to operate the glide slope receiver and its control unit. It also supplies power through a step-down transformer (115 to 26 volts) to operate the ID-663 in conjunction with the TACAN. The primary system provides single-phase power to the three-phase adapter which converts the power to three-phase for operation of the gyro magnetic compass, the gyrosyn compass indicator, and the attitude indicator. The auxiliary ac system furnishes power to operate the TACAN receiver-transmitter. The primary system is protected by a 25-ampere circuit breaker and controlled by a switch. The auxiliary system is protected by a 60-ampere circuit breaker and controlled by a 5-ampere push-pull type circuit breaker. Inverter failure lamps are provided to indicate the status of ac power.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect electrical plug from inverter.

(3) Remove mounting screws from base of inverter and remove inverter.

b. Cleaning. Wipe exterior of inverter clean with a clean, lint-free cloth dampened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect case for dents and cracks.

(2) Inspect receptacle for corrosion.

d. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position inverter and secure with mounting screws.

(3) Connect electrical plug to inverter.

12-205. INVERTERS. (RU-8D)

12-206. The aircraft's dc system powers the inverters. Two single-phase inverters, a main and a standby, provide 115 vac power for operating the glide slope receiver. 115 vac power for operating the attitude indicator is provided by two three-phase inverters. One inverter is provided for normal use and the other for use as a standby. The ASN-64 doppler, the C12 compass, the drift meter excitation, and the AN/APX-72 transponder receive 115 vac from two 750 VA, single-phase inverters. The 750 VA inverters also provide 115 vac which is stepped down to 26 vac to operate the 26 vac compass excitation. One 750 VA inverter is provided for normal use and the other for use as a standby. The 750 VA inverters are controlled by a switch and protected by a 60-ampere circuit breaker. The other single-phase inverters are controlled by a switch and are protected by 10-ampere circuit breakers. 10-ampere circuit breakers protect the three-phase inverters, which are controlled by a switch.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect electrical plug from inverter.

(3) Remove mounting screws from base of inverter and remove inverter.

b. Cleaning. Wipe exterior of inverter clean with a clean, lint-free cloth dampened with dry cleaning solvent (item 6, table 1-8).

c. Inspection. (1) Inspect case for cracks and dents.

(2) Inspect receptacle for corrosion.

d. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position inverter and secure with mounting screws.

(3) Connect electrical plug to inverter.

12-207. INVERTERS. (U-8F)

12-208. U-8F (STD). The inverters are powered by the aircraft's dc system. The three-phase inverters on aircraft serial No. 61-2426 through 61-2430 provide 115-volt alternating current for

operating the MM-3 attitude indicator. One inverter is provided for normal use and the other for use as a standby. The inverters are protected by 10-ampere circuit breakers and controlled by a switch. The single-phase inverters provide 115-volt alternating current for operating the attitude indicator, gyrosyn compass indicator, glide slope receiver, and radar set. One inverter is provided for normal use and the other for use as a standby. If the main inverter fails, the radar will not operate from the standby inverter. A phase adapter in the ac inverter circuit converts single phase current from the inverter to three-phase current for powering the attitude indicator, gyrosyn compass indicator, and radar set. The inverters are controlled by a switch. The main inverter is protected by a 50-ampere circuit breaker and the standby inverter is protected by a 10-ampere circuit breaker.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove screws securing access cover to inverter located in the nacelle and remove access cover.

(3) Disconnect electrical plug from inverter.

(4) Remove mounting screws and remove inverter.

b. Inspection. (1) Inspect case for dents and cracks.

(2) Inspect receptacle for corrosion.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Place inverter in proper position and install mounting screws.

(3) Connect electrical plug to inverter.

(4) Position access cover to inverter located in the nacelle in the proper position and secure with screws.

12-208A. U-8F (ASAC). The inverter system for U-8F (ASAC) aircraft consists of two single-phase, 750-VA inverters. The two standard 250-VA inverters have been removed. One inverter (MAIN) is provided for normal use while the other (SECONDARY) provides 115 VAC power for the AN/APN-158 radar under normal operation and for prime 115 VAC power as well as the radar, should the main inverter fail. Under normal operation, the main inverter supplies ac power to the TACAN, the 26-VAC navigation instrument transformer, and Glide Slope Receiver R-746; the main inverter provides power also to the MC-1 gyroscope, the MD-1 gyroscope, and the MM3A attitude indicator through a phase adapter. The secondary inverter provides 115 VAC power only to the APN-158 radar under

normal conditions and power to other navigational equipment referenced above should the main inverter fail. Both inverters are controlled by switches and have INVERTER FAIL lamps installed. The main inverter is protected by a 50-ampere circuit breaker and the secondary by a 60-ampere circuit breaker. Removal, inspection, and installation procedures are identical to those given for U-8F (STD) configurations.

12-209. SWITCHES.

12-210. RU-8D, U-8G, U-8D and U-8F (STD). The primary inverter switches on the U-8D, the U-8F (STD), the U-8G, and the RU-8D are three-position toggle-type switches. The switch for the 750-VA, single-phase inverters in the RU-8D is placarded MAIN and STANDBY. All other inverter switches in U-8 aircraft of configurations noted above are placarded MAIN, OFF, and STANDBY. For maintenance instructions for switches, refer to paragraph 12-17.

12-210A. U-8F (ASAC). The inverter switches for U-8F, are two-position toggle-type switches. Both switches are placarded ON and OFF. Both inverters (MAIN and SECONDARY) are designed to operate at all times (when radar is in use).

12-211. CIRCUIT BREAKERS.

12-212. The circuit breakers protect the inverters from overload. For maintenance on circuit breakers refer to paragraph 12-21.

12-213. RELAYS. U-8D (STD), U-8F (STD), U-8G, RU-8D

12-214. Two relays are used in the inverter circuit to operate the inverter warning light and to switch the output of the inverter in operation to the ac buses.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect wiring to relay.

(3) Remove mounting screws and remove relay.

b. Inspection. (1) Inspect case for dents and cracks.

(2) Inspect terminals for corrosion.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install relay and secure with mounting screws.

(3) Connect wiring to relay terminals.

12-214A. U-8F (ASAC). Six relays are used in the U-8F (ASAC) inverter circuits to operate the inverter warning lights and to permit equipment operation from the secondary inverter output, should the main inverter fail. Removal, inspection, and installation procedures for the relays are identical to those specified above.

12-214B. U-8D (ASAC). Four relays are used in the U-8D (ASAC) inverter circuits to operate the inverter warning light and to switch the output of the inverter in operation to the ac buses. Removal, inspection, and installation procedures for the relays are identical to those specified above.

12-215. WARNING LIGHTS.

12-216. The warning light is a press-to-test light. Lack of power from the operating inverter will cause the warning light to illuminate. For maintenance of warning lights refer to paragraph 12-235.

12-217. PHASE ADAPTER.

12-218. The phase adapters for U-8F aircraft and U-8D (ASAC) aircraft are located in the ac

inverter circuit and convert single-phase current to three-phase current for powering the equipment which requires three-phase current.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect electrical leads from phase adapters.

(3) Remove mounting screws and remove phase adapter.

b. Inspection. (1) Inspect case for dents or cracks.

(2) Inspect terminals for corrosion.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Place phase adapter in proper position and secure with mounting screws.

(3) Connect electrical leads to phase adapter.

SECTION V LIGHTING PROVISIONS

12- 219. GENERAL.

12-220. The U-8 aircraft are provided with interior and exterior lighting. Interior lighting provides illumination for the instrument panel, subpanels, and radio controls. The aircraft interior is also provided with various courtesy lights. Exterior lighting consists of navigation lights, landing lights, a passing and taxi light, and an anti-collision light.

12-221. INTERIOR LIGHTING.

12-222. The U-8 aircraft is provided with interior lighting for night flying purposes. Instrument panel lighting is provided by individual red lights installed at the top edge of each instrument. Also two red lights mounted in the overhead light control panel are positioned to illuminate the panel. A map light is mounted in the overhead panel just aft of the light control panel. Utility lights attached to coiled retractable cables are provided at each side of the instrument panel. In U-8D, U-8G, and RU-8D aircraft, the plastic panels on the radio equipment controls and the subpanel switch placard strip are illuminated by flush mounted panel lamps. The circuit breaker panel is illuminated when the panel doors are opened. In U-8F aircraft, the subpanels, radio control panels, the overhead light control panel, and the fuel selector panel are fitted with edge-lighted plastic panels with recessed bulbs furnishing lights for the placarding. In U-8D, U-8G, and RU-8D aircraft, overhead reading lights are provided for use by the occupants of the rear seat. Compartment lights are provided in the nose equipment compartment and baggage compartment. In U-8D, U-8G, and RU-8D aircraft, courtesy lights illuminate the outside step and the cabin threshold when the cabin door is opened. In U-8F aircraft, cabin lighting consists of five dome lights controlled by a switch on the instrument subpanel, five individually controlled reading lights, a threshold light, and cabin sign lights.

12-223. INSTRUMENT LIGHTS.

12-224. In U-8D, U-8G, and RU-8D aircraft, instrument lighting is provided by individual

lights secured to the instrument panel. A metal cover with a red filter fits over the lamp to direct the light obliquely across the instrument face. Light intensity is controlled by the FLIGHT INSTRU PANEL LIGHTS and ENG INSTRU AND RADIO PANEL LIGHTS rheostat controls on the overhead control panels.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect wire to light from instrument panel terminal strip, cut terminal from lead to allow retaining nut for light assembly to be removed.

(3) Remove retaining nut from light assembly and remove light assembly from instrument panel.

b. Inspection. (1) Inspect wiring for broken insulation and security of attachment to light.

(2) Inspect mounting flange and attaching nut for malformed threads.

(3) Inspect cover for condition of red filter and proper fit to base of light.

(4) Inspect center contact for corrosion or other condition which would prevent good contact between lamp and light.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install wire through opening in instrument panel and position light in instrument panel. Thread wire through nut and install nut on light assembly.

(3) Install a new terminal on end of wire and install wire to proper position on terminal strip.

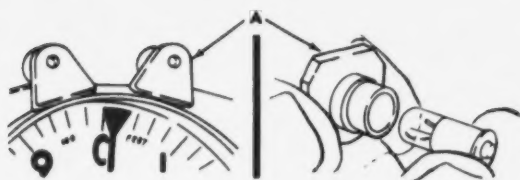
d. Lamp replacement. See figure 12-16.

12-225. OVERHEAD INSTRUMENT AND MAP LIGHTS.

12-226. Two lamps in the overhead panel provide overall illumination of the instrument panel. Red lenses installed in the panel reduce glare and prevent night-blindness. The lights are controlled by a rheostat in the overhead light control panel. The circuit is protected by a 10-ampere circuit breaker. The map light is mounted between the overhead instrument panel lights.

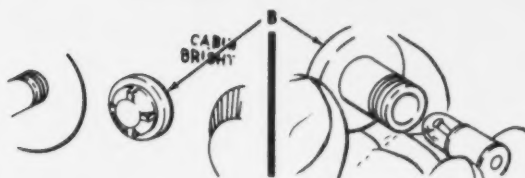
a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

INSTRUMENT LIGHTS



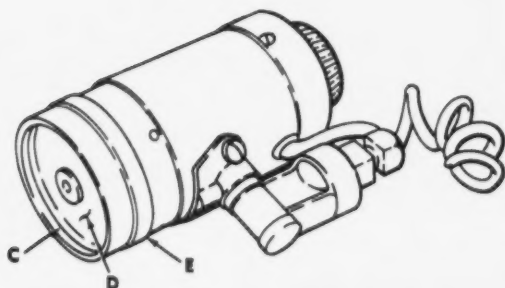
1 PULL LIGHT SHIELD (A) FROM LIGHT ASSEMBLY AND REMOVE LAMP.

EDGE-LIGHTED PANEL LIGHTS



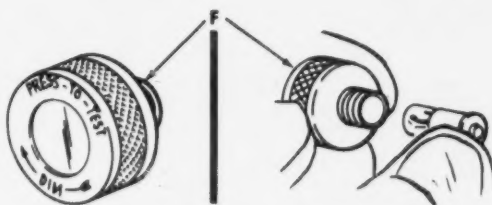
2 UNSCREW CAP-FILTER ASSEMBLY (B) FROM LIGHT SOCKET AND REMOVE LAMP.

UTILITY LIGHT



3 REMOVE LENS RETAINING RING (C) AND LENS (D). ROTATE ADJUSTING RING (E) TO FULL COUNTERCLOCKWISE POSITION AND REMOVE LAMP.

PRESS-TO-TEST INDICATOR LIGHT



4 UNSCREW CAP ASSEMBLY (F) AND REMOVE LAMP.

5 SWING SHIELD (G) UP AND REMOVE LAMP(H).



COMPASS LIGHT

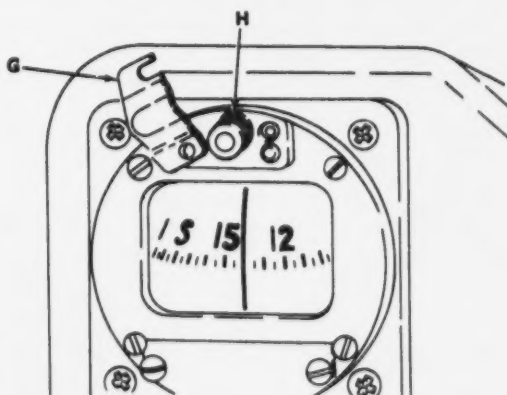
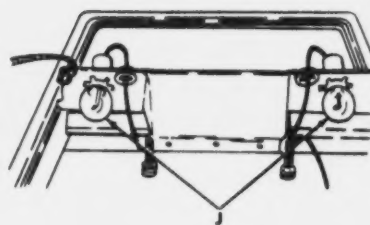
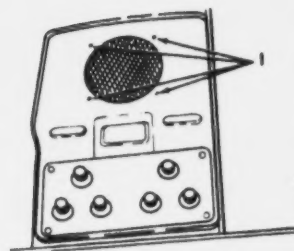


Figure 12-16. Interior lighting (sheet 1 of 2)

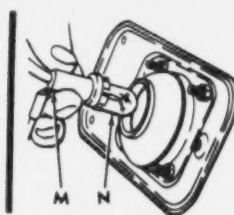
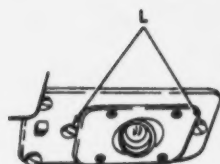
MAP LIGHT AND CABIN RED LIGHTS



6 REMOVE SCREWS (I) AND SPREAD UPHOLSTERY HOLDING TO LOWER LIGHT PANEL COVER.

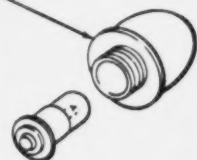
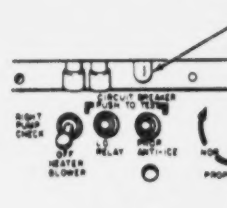
REMOVE CABIN RED LIGHT LAMPS (J) AND MAP LIGHT LAMP (K).

OVERHEAD READING LIGHTS



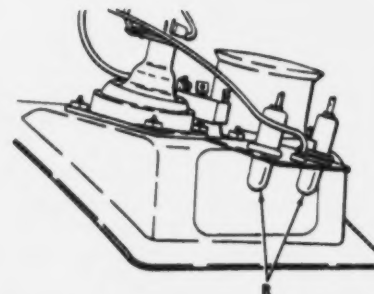
7 REMOVE SCREWS (L) AND LOWER LIGHT ASSEMBLY. REMOVE SOCKET (M) AND LAMP (N).

CIRCUIT BREAKER PLACARD LIGHTS



8 REMOVE FILTER (O) FROM LIGHT SOCKET AND REMOVE LAMP FROM FILTER.

CABIN DOME AND READING LIGHTS



9 PULL LENS (P) FROM READING LIGHT ASSEMBLY AND REMOVE LAMP.

REMOVE SCREWS (Q) AND PULL PANEL AWAY FROM FUSE LAGE REMOVE DOME LIGHT LAMPS (R).

Figure 12-16. Interior lighting (sheet 2 of 2)

(2) Remove overhead light control panel cover as shown in step 6, figure 12-16.

(3) Disconnect electrical leads.

(4) Remove bulbs from sockets and pull sockets from brackets in cover.

b. Inspection. (1) Inspect mounting hardware and electrical terminals for distortion and corrosion.

(2) Inspect clips for resiliency. Make sure the lights are held securely when installed.

(3) Inspect red filter to make sure no white light leaks through.

(4) Inspect translucent window in overhead light panel cover for foreign matter and security.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Insert lamp socket into bracket in cover.

(3) Connect the electrical leads and install bulbs.

(4) Install overhead light panel cover and secure with attaching hardware.

d. Lamp replacement. See figure 12-16.

12-227. UTILITY LIGHTS.

12-228. The U-8F utility lights are connected to the microphone terminal strips at each side of instrument panel. U-8D and RU-8D utility lights are connected to right hand subpanel terminal strip. Four foot extendable cords on each lamp permits the lamps to be mounted in any one of the base assemblies provided in the cockpit. A swivel joint allows the light beam to be focused on any desired spot. The light beam can be adjusted for varying intensities with the red rheostat knob on the back of the lamp. The push button on the rheostat knob provides momentary full light intensity at any knob position. Rotating the ring on the front of the lamp adjusts the lens to provide a red spot light, a red floor light, a white spot light, or a white flood light. The circuits are protected by a 5-ampere circuit breaker.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Disconnect utility light cable from microphone strip.

(3) Remove utility light from mounting.

b. Inspection. (1) Inspect lens for security, chips, and cracks.

(2) Ensure lens barrel operates smoothly and freely.

(3) Ensure dimming rheostat operates properly through its normal range.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure

external power source is disconnected.

(2) Install utility light in mounting.

(3) On U-8F aircraft connect utility light cable to proper terminals on microphone strip.

(4) On U-8D and RU-8D aircraft connect utility light cable to right hand subpanel terminal strip.

d. Lamp replacement. See figure 12-16.

12-229. MAGNETIC COMPASS LIGHT.

12-23 The magnetic compass light, located above the face of the compass, provides necessary lighting so that the compass card is visible. As the magnetic compass light is an integral part of the compass, replacement of the light is accomplished by replacing the entire magnetic compass assembly (paragraph 10-31). For lamp replacement, see figure 12-16.

12-231. EDGE-LIGHTED PANEL LIGHTS.

12-232. The plastic panels in the aircraft are provided with recessed lights to provide illumination of lettering and controls. The lamp-holders on the lights provide filtering of the light and serves as a bulbholder. The socket portion of the light is secured to the metal panel or mounting plate behind the panel.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove lamp holders and lamps.

(3) Remove any control knobs or other components which would interfere with removal of plastic panel and remove plastic panel.

(4) At rear of light, remove wire from terminal strip and cut terminal from end of wire.

(5) Remove mounting nut and pull light and wire through hole in panel or mounting plate.

b. Inspection. (1) Inspect wiring for broken insulation and security of attachment to light.

(2) Inspect mounting flange and attaching nut for malformed threads.

(3) Inspect cover for condition of red filter and proper fit to base of light.

(4) Inspect center contact for corrosion or other condition which would prevent good contact between lamp and light.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Feed wire through hole in panel or mounting plate. Install light and secure with mounting nut.

(3) Install terminal on end of wire and secure to proper terminal on terminal strip.

(4) Install plastic panel and any components removed in step a(3) above.

- (5) Install lamps and lamp holders.
- d. Lamp replacement. (See figure 12-16.)

12-233. INSTRUMENT SUBPANEL LIGHTS. (U-8D, U-8G, RU-8D)

12-234. The instrument subpanel lights are mounted above the circuit breakers and illuminate the circuit breakers and associated decals when the cover panels are hinged down.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) At rear of instrument subpanel, remove nut securing light to instrument subpanel.

(3) Pull light out of mounting hole in subpanel and unsolder light from wire.

(4) Secure wire to prevent loss of nut.

b. Inspection. (1) Inspect wiring for broken insulation.

(2) Inspect mounting flange and attaching nut for malformed threads.

(3) Inspect cover for condition of red filter and proper fit to base of light.

(4) Inspect center contact for corrosion or other condition which would prevent good contact between lamp and light.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Solder wire to terminal at rear of light using solder (item 80, table 1-8).

(3) Install light in front of subpanel and secure with mounting nut at rear of subpanel.

d. Lamp replacement. (See figure 12-16.)

12-235. WARNING AND INDICATOR LIGHTS.

12-236. The warning and indicator lights give indication of the condition or position of various aircraft systems. The warning and indicator lights include the following; INVERTER POWER OFF, L-ENG. CHIP DET.-R, CABIN DOOR UNLOCKED, MARKER BEACON, INVERTER OUT, CAUTION STEP DOWN, LDG GEAR DOWN & LOCKED, and WING FLAP POSITION indicator lights. The warning and indicator lights incorporate a press-to-test circuit which bypasses the normal circuit and applies power to determine if the lamp is operative.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove wiring from terminals at rear of warning or indicator light to be removed.

NOTE

Tag or otherwise identify wiring to aid installation.

(3) Remove attaching hardware and remove warning or indicator light.

b. Inspection. (1) Inspect lens and cap for cracks and distortion.

(2) Inspect light assembly barrel for cracks and corrosion.

(3) Inspect electrical terminals for security.

(4) Inspect mounting nut and threaded portion of light for malformed threads.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove identifying tags and connect electrical wires.

(3) Position and secure applicable panel on its mounting.

d. Lamp replacement. (See figure 12-16.)

12-237. TAB POSITION LIGHTS.

12-238. The tab position lights are mounted in the control console, and illuminate the aileron tab indicator, the elevator tab indicator, and the rudder tab indicator. The light sockets snap into holes in the pedestal structure just forward of the indicators. Light wiring is connected to the left hand subpanel terminal strip.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove light and bulb assembly by unsnapping socket from mounting hole in console.

(3) Disconnect light wiring at left hand subpanel terminal strip.

b. Inspection. (1) Ensure that lamp is securely fastened in socket.

(2) Inspect bulb contact and contact of light to ensure a good electrical contact.

(3) Inspect light for cleanliness and for corrosion.

(4) Inspect snap-in portion of light for resiliency and malformation.

(5) Inspect wiring for breaks and deterioration of insulation.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to proper terminal at left-hand subpanel terminal strip.

(3) Snap light and bulb assembly into mounting hole in console.

d. Lamp replacement. (See figure 12-16.)

12-239. CABIN STEP LIGHT. (U-8D, RU-8D)

12-240. The cabin step light is mounted adjacent to the main spar on the right hand side of the cabin. A normally closed microswitch turns the light on when the cabin door is opened.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove lens from light and remove metal strip adjacent to lens.

(3) Remove light and bulb assembly from mounting hole.

(4) Remove right front passenger seat to gain access to panel beneath seat. Remove panel.

(5) Disconnect wiring by separating wire splice and remove cabin step light.

NOTE

For ease in installation, connect a piece of twine or scrap wire at splice, pull through to location of cabin step light, and remove from splice. Use this for a pull wire in installation procedures.

b. Inspection. (1) Ensure that bulb fastens securely in socket.

(2) Inspect bulb contact and contact of light to make sure that a good electrical connection is made.

(3) Inspect light for cleanliness and corrosion.

(4) Inspect snap-in portion of light for resiliency and malformation.

(5) Inspect wiring for breaks and deterioration of insulation.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Feed splice through cabin step light mounting hole and connect to splice beneath right front passenger seat.

(3) Install panel and right front passenger seat.

(4) Install light and bulb assembly in mounting hole.

(5) Install metal strip and lens.

d. Lamp replacement. See figure 12-16.

12-241. NOSE EQUIPMENT COMPARTMENT LIGHT.

12-242. The nose equipment compartment light is mounted in a bracket secured to the aircraft structure in the top of the compartment. The light is turned on by a microswitch when the compartment door is opened.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove attaching screws and lens. Remove bulb.

(3) Straighten socket retaining tabs and remove socket from reflector assembly.

(4) Disconnect wiring and remove light.

b. Inspection. (1) Ensure that bulb fastens securely in socket.

(2) Inspect bulb contact and contact of light to make sure that a good electrical connection is made.

(3) Inspect light for cleanliness and corrosion.

(4) Inspect retaining tabs for cracks and fatigue.

(5) Inspect wiring for breaks and deterioration of insulation.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring to proper terminals.

(3) Position the socket in the reflector assembly and secure by bending the retaining tabs.

(4) Install the bulb. Install the lens and secure with attaching screws.

d. Lamp replacement. (1) Remove attaching screws and lens. Remove lamp.

(2) Install a serviceable lamp. Install lens and secure with attaching screws.

12-243. CABIN READING LIGHTS.

12-244. The cabin reading lights are installed in the panels above the windows with the cabin dome lights. The reflector assembly of each light is free to move so that it may be focused on any spot desired by the user. A slide-button type switch is installed in the panel for controlling the light.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove attaching screws and pull light panel away from upholstery.

(3) Disconnect wiring from lamp socket.

(4) Remove attaching hardware and remove light from panel.

b. Inspection. (1) Ensure that bulb fastens securely in socket.

(2) Inspect bulb contact and contact of light to make sure that a good electrical connection is made.

(3) Inspect light for cleanliness and corrosion.

(4) Inspect retaining tabs for cracks and fatigue.

(5) Inspect wiring for breaks and deterioration of insulation.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position light in panel and install attaching hardware.

(3) Connect wiring to lamp socket.

(4) Position light panel on upholstery and install attaching screws.

d. Lamp replacement. (See figure 12-16.)

12-245. THRESHOLD LIGHT. (U-8F)

12-246. The threshold light and light switch are located just above the floor, forward of the cabin door. When the switch is on, the light is controlled by a microswitch actuated by the cabin door. The light can be turned off by either closing the door, or turning the switch to the OFF position.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove kick strip from seat mounting structure.

(3) Remove reflector assembly from threshold light.

(4) Remove bulb, and pull the snap-in socket from reflector.

(5) Disconnect wiring at splice.

b. Inspection. (1) Ensure that bulb fastens securely in socket.

(2) Inspect bulb contact and contact of light to be sure that a good electrical connection is made.

(3) Inspect light assembly for cleanliness and corrosion.

(4) Inspect snap-in portion of light for resiliency and malformation.

(5) Inspect wiring for breaks and deterioration of insulation.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Connect wiring at splice.

(3) Snap socket into the reflector and install bulb.

(4) Install reflector assembly.

(5) Install kick plate and seat mounting structure.

d. Lamp replacement. (1) Remove kick plate from aft end of left seat deck.

(2) Remove defective lamp and substitute a serviceable replacement.

(3) Install kick plate to aft end of left seat deck.

12-247. OVERHEAD READING LIGHTS (U-8F)

12-248. The overhead reading lights are mounted to the upper fuselage at each side of the rear passenger seats, to provide a white light for use by the rear seat passengers. The reflector assembly is free to move and may be focused on any spot desired by the user.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove attaching hardware and overhead light panel.

(3) Disengage snap-in socket and remove wiring. Remove socket.

b. Inspection. (1) Ensure that bulb fastens securely in socket.

(2) Inspect bulb contact and contact of light to be sure that a good electrical connection is

(3) Inspect light assembly for cleanliness and corrosion.

(4) Inspect snap-in portion of light for resiliency and malformation.

(5) Inspect wiring for breaks and deterioration of insulation.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install wiring and engage snap-in socket.

(3) Install overhead light panel and secure with attaching hardware.

d. Lamp replacement. See figure 12-16.

12-249. CABIN SIGN LIGHTS. (U-8F)

12-250. The cabin sign on the forward cabin bulkhead is illuminated by four recessed type lights of the same type which are used to illuminate the edge-light panels. Refer to paragraph 12-231 for maintenance instructions.

12-251. CABIN DOME LIGHTS. (U-8F)

12-252. The passenger compartment is illuminated with five dome lights, three on the right side of the cabin and two on the left side. They are mounted above the windows in panels which also contain the cabin reading lights and cabin ventilating outlets. The lights are controlled by a switch on the instrument subpanel.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove attaching hardware and overhead light panel. Disconnect wiring at splice.

- (3) Remove light from bracket.
- b. Inspection. (1) Ensure that bulb fastens securely in socket.
- (2) Inspect bulb contact and contact of light to be sure that a good electrical connection is made.
- (3) Inspect light assembly for cleanliness and corrosion.
- c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.
- (2) Install light in bracket.
- (3) Connect wiring at splice. Install overhead light panel and secure with attaching hardware.
- d. Lamp replacement. See figure 12-16.

12-253. EXTERIOR LIGHTING.

12-254. The exterior lighting on the aircraft consists of navigation lights at each wing tip and in the tail cone, a landing light in the leading edge of each wing, a passing and taxi light, and an anticollision light at the tip of the vertical stabilizer. U-8F aircraft have an additional anticollision light on the underside of the fuselage center section. The passing and taxi light is located in the nose cone of the U-8D, U-8G, and RU-8D aircraft and on the nose landing gear of U-8F aircraft.

12-255. LANDING LIGHTS.

12-256. A 250-watt sealed-beam landing light is recessed behind a transparent plastic cover in the leading edge of each wing. Each light is controlled by individual switches on the instrument subpanel. Two 15-ampere push-pull type circuit breakers in the right circuit breaker panel protect the circuits from overloads.

- a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.
- (2) Remove screws securing shield retainer to leading edge of wing.
- (3) Remove shield retainer and shield from leading edge of wing.
- (4) Remove light retaining clamp from sealed beam unit. Remove wiring from terminals and remove sealed beam unit.
- b. Inspection. (1) Inspect mounting screws and terminal screws for malformed threads.
- (2) Inspect gaskets for cracks and resiliency.
- (3) Inspect landing light cover for transparency and discoloration.
- (4) Inspect sealed beam unit for cloudiness and peeling of reflective surface.

- (5) Inspect terminals for security and corrosion.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install wiring to proper terminals at rear of sealed beam unit. Install sealed beam unit light retaining clamp and secure.

(3) Install shield and shield retainer in position on leading edge of wing.

(4) Secure retainer by installing screws.

d. Lamp replacement. See figure 12-17.

12-257. PASSING AND TAXI LIGHT.

12-258. The passing and taxi light is a sealed beam unit with white lens, installed in the fuselage nose cone of U-8D, U-8G and RU-8D aircraft; and on the nose landing gear of U-8F aircraft. The light is controlled by a switch on the left subpanel. A 5-ampere, push-pull type circuit breaker on the right subpanel protects the circuit from overloads.

a. Removal. (1) Remove passing and taxi light from U-8D, U-8G, and RU-8D aircraft as follows:

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Remove attaching screws and retaining ring from passing and taxi light.

(c) Pull out sealed beam unit and remove wiring from terminals. Remove sealed beam unit.

(2) Remove passing and taxi light from U-8F aircraft as follows:

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Remove bolt, washer, and nut securing passing and taxi light assembly to nose landing gear.

(c) Remove bolt, washer, and nut and remove retaining ring from passing and taxi light.

(d) Pull out sealed beam unit from light assembly housing, remove wiring from terminals, and remove sealed beam unit and light assembly housing from nose landing gear.

b. Inspection. (1) Inspect attaching screws or bolts and terminal screws and malformed threads.

(2) Inspect sealed beam unit for cloudiness and peeling of reflective surface.

(3) Inspect terminals for security of attachment and evidence of corrosion.

c. Installation. (1) Install passing and taxi light on U-8D, U-8G, and RU-8D aircraft as follows:

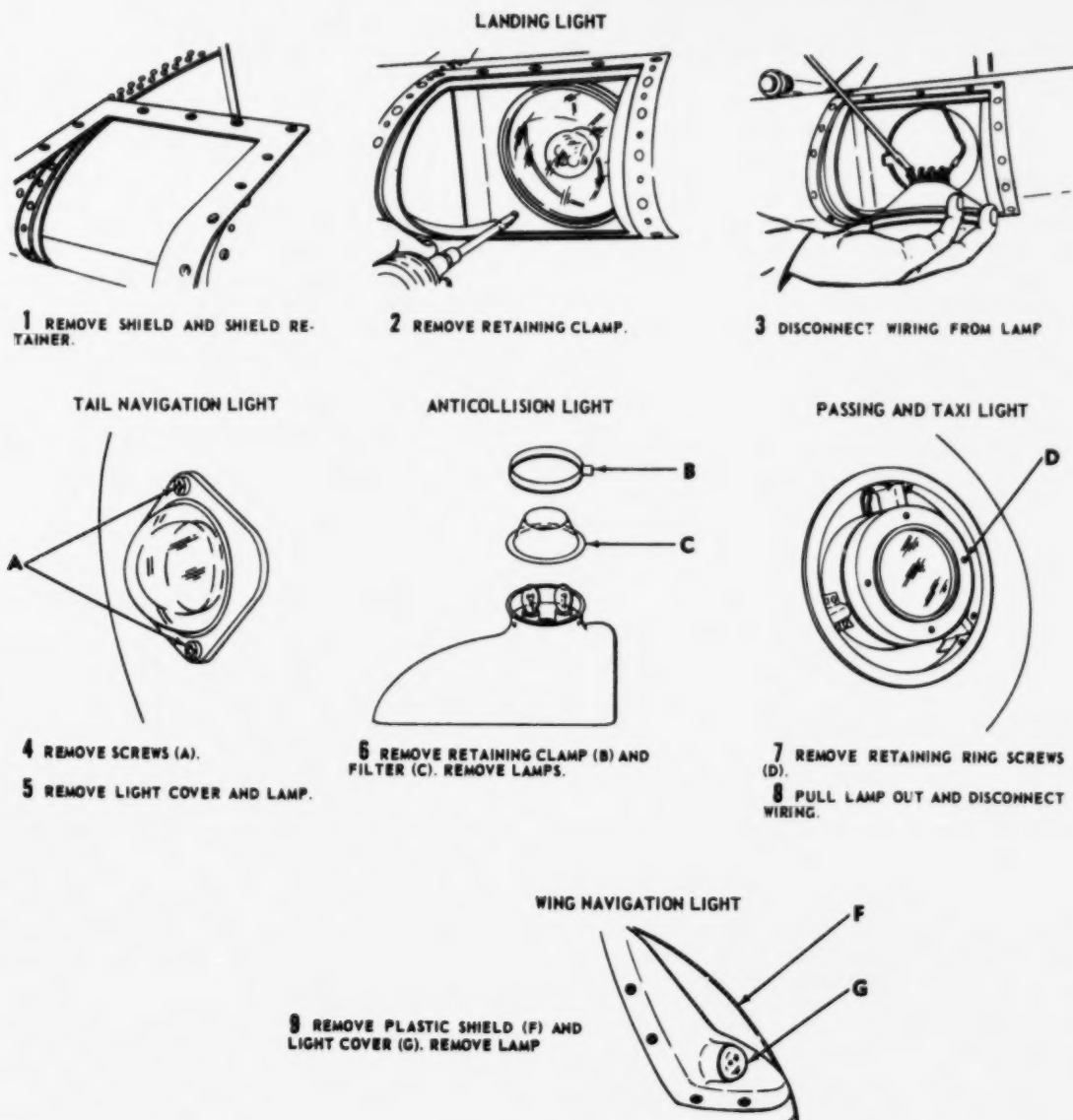


Figure 12-17. Exterior lighting

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Insert sealed beam unit and connect wiring to terminals.

(c) Secure passing and taxi light with retaining ring and attaching screws.

(2) Install passing and taxi light on U-8 Faircraft as follows:

(a) Place battery and generator master switches in OFF position. Make sure electrical power source is disconnected.

(b) Insert sealed beam unit in light assembly housing.

(c) Place retaining ring over sealed beam unit and light assembly housing and secure with bolt, washer, and nut.

(d) Secure wiring to terminals.

(e) Position assembled passing and taxi light assembly in place on nose landing gear and secure with bolt, washer, and nut.

d. Lamp replacement. See figure 12-17.

12-259. NAVIGATION LIGHTS.

12-260. There are three navigation lights: a red light on the left wingtip, a green light on the right wing tip, and a white light on the rear of the tail cone. U-8D, U-8G, and RU-8D aircraft have single or dual lights on each wing tip with plastic indicators visible from the flight compartment, and are controlled by the NAV LIGHTS OFF-ON switch on the left subpanel and NAV LIGHTS STEADY-FLASH switch on the right subpanel. U-8F aircraft wing navigation lights are recessed into the wing tips and covered with clear plastic shields conforming to the contour of the wing tip, and are controlled by a three-position toggle switch on the left subpanel. In all aircraft, the flasher unit is mounted behind the instrument panel at the right of the control column.

a. Removal. (1) Remove U-8D, U-8G and RU-8D navigation lights as follows:

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Remove lens retainer and lens by removing attaching screws. Remove lamp.

(c) Remove light assembly attaching screws and disconnect wiring at rear of lamp base.

(d) Remove lamp base.

(2) Remove U-8F navigation lights as follows:

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Remove attaching hardware and light shield from wing tip.

(c) Remove lens retainer and lens by removing attaching screws.

(d) Remove lamp.

(e) Remove attaching hardware and pull light assembly from mounting hole. Disconnect wiring and remove light assembly.

b. Inspection. (1) Inspect mounting screws and terminal screws for malformed threads and corrosion.

(2) Inspect lamps and all transparent surfaces for darkening or other discoloration.

(3) Inspect plastic parts for cracks or other damage.

(4) Inspect terminals for security and corrosion.

c. Installation. (1) Install U-8D, U-8G, and RU-8D navigation lights as follows:

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Connect wiring to light assembly and install in mounting hole. Secure with attaching hardware.

(c) Install lamp.

(d) Install lens and lens retainer. Secure with attaching screw.

(2) Install U-8F navigation lights as follows:

(a) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(b) Connect wiring to light assembly and install in mounting hole. Secure with attaching hardware.

(c) Install lamp.

(d) Install lens and lens retainer. Secure with attaching screw.

(e) Install light shield on wing tip and secure with attaching hardware.

d. Lamp replacement. See figure 12-17.

12-261. NAVIGATION LIGHTS FLASHER UNIT.

12-262. The navigation lights flasher unit is located at right of the control column behind the instrument panel. The flasher causes the lights to flash on 60 to 120 times per minute. The design of the flasher causes the lights to come on steady if flasher failure should occur during normal operation.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove attaching hardware and cover from navigation light flasher. Disconnect wiring and ground strap from navigation light flasher.

NOTE

Tag and identify location of electrical wires and ground strap to aid in installation.

(3) Remove attaching hardware and navigation light flasher.

b. Inspection. (1) Inspect cover for dents and distortion.

(2) Inspect shock mounts for resiliency and deterioration.

(3) Inspect flasher cartridge for broken glass and for security of mounting.

(4) Inspect relay coils for signs of overheating.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position navigation light flasher in shock mount and secure with attaching hardware.

(3) Remove identifying tags and connect electrical wires and ground strap to navigation light flasher.

(4) Install cover and secure with attaching hardware.

12-263. ANTI-COLLISION LIGHTS.

12-264. All U-8 aircraft have a single anti-collision light mounted at the top of the vertical stabilizer. U-8F aircraft have an additional anti-collision light mounted beneath the fuselage center section. The anti-collision lights are identical except for location. The anti-collision lights rotate at a rate of 40 rpm, and the dual lamps give a flashing effect to an observer at any compass point around the aircraft. The lights are controlled by a toggle switch on the instru-

ment panel. A circuit breaker on the subpanel protects the circuit from overloads.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove retaining screws and remove entire light from fairing.

(3) Remove disconnect plug from light.

b. Inspection. (1) Inspect lens for cracks, cloudiness and discoloration.

(2) Make sure retainer holds lens securely to light.

(3) Inspect screws for corrosion and malformed threads.

(4) Inspect connector for corrosion, foreign matter, and distorted contacts.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install disconnect plug to anti-collision light.

(3) Install light in fairing and secure with retaining screws.

d. Lamp replacement. See figure 12-17.

SECTION VI MISCELLANEOUS EQUIPMENT

Not Applicable

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Position navigation light flasher in shock mount and secure with attaching hardware.

(3) Remove identifying tags and connect electrical wires and ground strap to navigation light flasher.

(4) Install cover and secure with attaching hardware.

12-263. ANTI-COLLISION LIGHTS.

12-264. All U-8 aircraft have a single anti-collision light mounted at the top of the vertical stabilizer. U-8F aircraft have an additional anti-collision light mounted beneath the fuselage center section. The anti-collision lights are identical except for location. The anti-collision lights rotate at a rate of 40 rpm, and the dual lamps give a flashing effect to an observer at any compass point around the aircraft. The lights are controlled by a toggle switch on the instrument panel. A circuit breaker on the subpanel protects the circuit from overloads.

NOTE

The lens assembly, figure 12-17, illustration 6, item C, on the U-8F vertical stabilizer installation has a red stripe painted on the forward side of the lens. This red stripe helps prevent glare from hitting the instrument panel and averts possible pilot fixation. Refer to appendix "E" of this Technical Manual for painting instructions.

a. Removal. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Remove retaining screws and remove entire light from fairing.

(3) Remove disconnect plug from light.

b. Inspection. (1) Inspect lens for cracks, cloudiness and discoloration.

(2) Make sure retainer holds lens securely to light.

(3) Inspect screws for corrosion and malformed threads.

(4) Inspect connector for corrosion, foreign matter, and distorted contacts.

c. Installation. (1) Place battery and generator master switches in OFF position. Make sure external power source is disconnected.

(2) Install disconnect plug to anti-collision light.

(3) Install light in fairing and secure with retaining screws.

d. Lamp replacement. See figure 12-17.

SECTION VI MISCELLANEOUS EQUIPMENT

Not Applicable

CHAPTER 13

WIRING DIAGRAMS

SECTION I GENERAL

13-1. SCOPE.

13-2. The information contained in this section is intended to enable maintenance personnel to understand the makeup and function of electrical and avionics circuits. Detailed wiring diagrams for electrical circuits and interconnecting wiring diagrams for avionic equipment are included. Each component of equipment shown is assigned an index number for identification purposes.

13-3. ELECTRICAL WIRING.

13-4. The electrical wiring conforms, in general, to Military Specification MIL-W-5088 and meets the requirements of Military Specifications MIL-W-76, MIL-W-5086 and MIL-C-7078. Stranded, tinned, copper bonding strips are used to ground flying controls and moving parts. Some fixed components are bonded where it is desirable to insure a good ground. A junction box is used for interconnection and breakdown of circuits contained in cable assemblies. Multi-point connectors or terminal lugs are used to connect cable assemblies to junction boxes and panel assemblies. The cables in all assemblies are identified to indicate the system served.

13-5. WIRE IDENTIFICATION.

13-6. Wiring used in the aircraft is identified by a code of numbers and letters stamped at intervals throughout the wire length. Wire identification code is broken down as follows: (See figure 13-1.)

a. The initial letter (or letters) designates the circuit of which the wiring is a part.

b. The text number (or numbers) is the wire number which separates one section or leg of the circuit from all others.

c. The following letter indicates segments of wire in a wire number where the wire passes through or branches at a connector or terminal strip.

d. The number (or numbers) following the segment designation is the standard AWG wire size.

e. If the wire is in the ground portion of a circuit, the suffix N is added to indicate a ground return.

f. Where a wire code is duplicated, the unit number 1 of 2 is prefixed to differentiate between the two circuits.

13-7. ABBREVIATIONS.

13-8. Abbreviations used in this chapter are in accordance with MIL-STD-12 except where the abbreviation depicts a marking actually found in the aircraft.

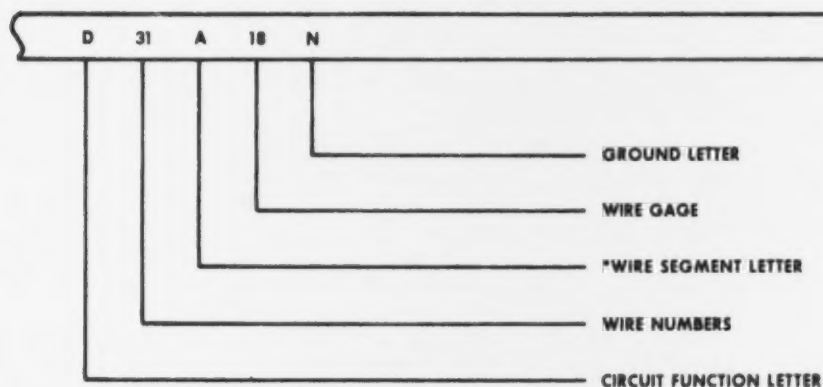
13-9. ELECTRICAL SYMBOLS.

13-10. The electrical symbols used in the wiring diagrams conform to Military Standard MIL-STD-15-1A. Figure 13-2 illustrates and identifies symbols and combinations of symbols used in the wiring diagrams: Where appropriate symbols are not available, the component is shown as a rectangle and identified in the equipment list.

13-11. EQUIPMENT LIST.

13-12. An equipment list (table 13-1) is provided to identify the components contained in the wiring diagrams. Each component is assigned an item number and the equipment list provides the correct nomenclature and part number for the corresponding number. The items are listed in numerical order.

WIRE CODE IDENTIFICATION



*IF DASH IS USED, IT INDICATES ONLY ONE SEGMENT.

CIRCUIT FUNCTION LETTERS

C	CONTROL SURFACES	RC	RADIO COMMUNICATIONS
D	MISCELLANEOUS INSTRUMENTS	RF	FM LIAISON RADIO SYSTEM
E	ENGINE INSTRUMENTS	RM	MARKER BEACON
F	FLIGHT INSTRUMENT	RN	RADIO NAVIGATION
Q	LANDING GEAR	RU	UHF COMMAND RADIO SYSTEM
H	HEATING, VENTILATING, AND ANTI-ICING	RV	VHF COMMAND RADIO SYSTEM
J	IGNITION	RZ	INTERPHONE SYSTEM
K	ENGINE CONTROL	SN	RADAR SYSTEM
L	LIGHTING	SX	IFF SYSTEM
P	DC POWER	V	DC POWER FOR AC SYSTEM
Q	FUEL AND OIL	X	AC SYSTEM
RA	GLIDE SLOPE		

Figure 13-1. Wire identification codes

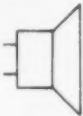
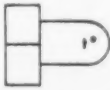
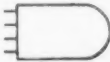
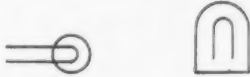
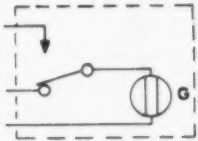
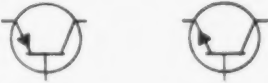
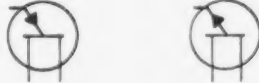
WARNING HORN 	FLASHER 	THERMOSTAT 
TEMPERATURE SENSING ELEMENT 	TEMPERATURE RESISTANCE BULB 	TIME DELAY RELAY 
FLAME DETECTOR 	LAMPS 	INDICATOR LIGHT 
LIGHT WITH PUSH-TO-TEST CIRCUIT 	DIODE 	REVERSE CURRENT DIODE 
ZENER DIODE 	CAPACITOR 	RESISTORS 
TRANSISTORS 	TRANSISTOR SWITCH (SCR) 	UNIUNCTION TRANSISTOR 

Figure 13-2. Electrical symbols chart (sheet 1 of 3)

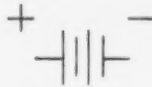
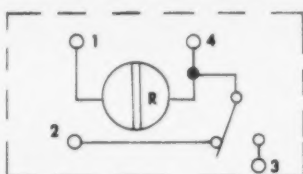
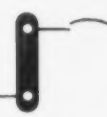
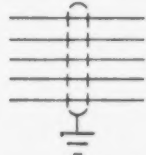
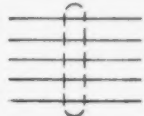
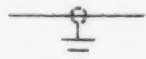
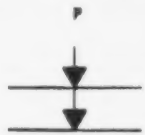
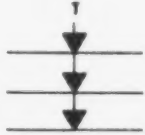
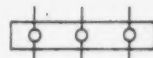
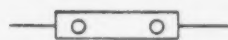
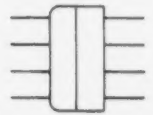
GROUND 	BATTERY 	CIRCUIT PROTECTORS   CIRCUIT BREAKER FUSE
WARNING & RESET SWITCH 	BUS BAR 	CONDUCTORS CROSSING   CONNECTED NOT CONNECTED
CONDUCTORS  MULTIPLE CONDUCTOR CABLE  GROUND SHIELD  UNGROUND SHIELD  SINGLE CONDUCTOR CABLE  GROUND SHIELD  UNGROUND SHIELD		TWISTED PAIRS AND TRIPLES  
COAXIAL CABLE 	SPICES   KNIFE PERMANENT	TERMINAL BOARD 
METER SHUNT 	CONNECTORS 	TEST JACKS 

Figure 13-2. Electrical symbols chart (sheet 2 of 3)

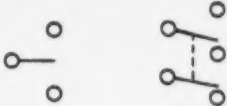
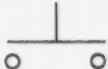
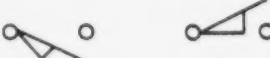
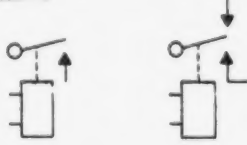
MECHANICAL CONNECTION 	TOGGLE SWITCHES 	PUSH BUTTON SWITCH 
ROTARY SWITCH 	MICROSWITCHES LIMIT SWITCHES 	LANDING GEAR LIMIT SWITCHES 
PRESSURE SWITCH 	FUEL LEVEL SWITCH 	TEMPERATURE ACTUATED SWITCH 
RELAYS 	MOTOR 	INVERTER 
MOTOR FIELD 	MOTOR ARMATURE 	BOOST PUMP 
TRANSFER PUMP 	FLAP POSITION TRANSMITTER 	FLAP POSITION INDICATOR 

Figure 13-2. Electrical symbols chart (sheet 3 of 3)

Table 13-1. Equipment list (sheet 1 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1	Battery Connecting Bus Cable	50-361224-10
2	RH Battery	R33
3	RH Battery Bus Cable	50-361224-66
4	RH Battery Relay	6042H200
5	RH Ground Bus Cable	50-361224-70
6	Battery Lock Switch	50-364122
7	Battery On-Off Switch	AN3021-2
8	LH Battery	R33
9	LH Battery Bus Cable	50-361224-66
10	LH Battery Relay	6042H200
11	LH Starter Relay Bus	50-261224-78
12	LH Starter Relay	MS2: 183D1
13	External Power Receptacle Bus	50-361248-10
14	External Power Receiver	AN2552A3A
15	LH Ground Bus Cable	50-361224-10
16	Main Belly Terminal Bus Cable	50-361224-62
17	Main Belly Terminal Post	814-180537
18	LH Floorboards Bus	50-364241
19	Landing Gear Circuit Breaker	PLM50
20	RH Generator Circuit Breaker	PDLM50
21	LH Generator Circuit Breaker	PDLM50
22	Step And Cigarette Lighter Circuit Breaker	D6761-1-15
23	Starter and Primer Circuit Breaker	D6761-1-5
24	RH Subpanel Bus Bar	50-364240
25	Wing Flap Circuit Breaker	D6761-1-15
26	Turn And Slip Indicator Circuit Breaker	D6761-1-3
27	Pitot Heat Circuit Breaker	D6761-1-10
28	LH Subpanel Terminal Strip Circuit Breaker	D6761-1-3
29	Flight Instrument Lights Circuit Breaker	D6761-1-5
30	Engine Instrument Lights Circuit Breaker	D6761-1-5
31	Navigation Down Light Dim Switch Circuit Breaker	D6761-1-3
32	Radio And Switch Panel Lights Circuit Breaker	D6761-1-5
33	RH Subpanel Bus Bar	50-364239
34	LH Fuel Boost Pump Selector Switch Circuit Breaker	D6761-1-10
35	RH Fuel Boost Pump Selector Switch Circuit Breaker	D6761-1-10
36	LH Landing Light Circuit Breaker	D6761-1-15
37	RH Landing Light Circuit Breaker	D6761-1-15
38	Fuel Quantity Indicator Circuit Breaker	PLM50
39	Stall Warning Horn And Manifold Pressure Warning Light Circuit Breaker	D6761-1-3
40	Navigation Light Circuit Breaker	D6761-1-5
41	Passing Light Circuit Breaker	D6761-3
42	RH Subpanel Placard Lights Circuit Breaker	D6761-1-10
43	RH Ammeter Shunt	258X8
44	LH Ammeter Shunt	258X8
45	RH Ammeter Shunt Bus	50-364070
46	LH Ammeter Shunt Bus	50-364059
47	RH Reverse Current Relay	AN3025-300
48	LH Reverse Current Relay	AN3025-300
49	RH Voltage Regulator	1589-1C
50	LH Voltage Regulator	1589-1C
51	RH Generator Equalizer Resistor	1002
52	LH Generator Equalizer Resistor	1002

Table 13-1. Equipment list (sheet 2 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC.
53	RH Firewall Receptacle	MS3100-32-6P
54	RH Firewall Plug	MS3106-32-6S
55	LH Firewall Receptacle	MS3100-32-6P
56	LH Firewall Plug	MS3106-32-6S
57	Generator Control Switch	MS35059-2
58	RH Generator Shunt	AND1050
59	LH Generator Shunt	AND1050
60	RH Generator	901-9B
61	LH Generator	901-9B
62	RH Generator Noise Filter	97JX703
63	LH Generator Noise Filter	97JX703
64	RH Voltammeter	50-380014-3
65	LH Voltammeter	50-380014-3
66	Nose Equipment Compartment Door Light Switch	BZ3YT
67	RH Starter On-OFF Switch	9095
68	RH Primer Switch	9095
69	LH Starter On-Off Switch	9095
70	LH Primer Switch	9095
71	RH Starter Bus	50-361224-74
72	RH Starter Relay	MS24183D1
73	RH Starter Motor	756-10C
74	RH Primer	12257-12
75	LH Starter Motor	756-10C
76	LH Primer	12257-12
77	Magneto Switch Bus Bar	50-364038
78	Left Magneto (RH Engine) On-Off Switch	MS35058-2
79	Left Magneto (RH Engine) Filter	63149
80	Left Magneto (RH Engine)	56IN51
81	Right Magneto (RH Engine) On-Off Switch	MS35058-2
82	Right Magneto (RH Engine) Filter	63149
83	Right Magneto (RH Engine)	56IN50
84	Left Magneto (LH Engine) On-Off Switch	MS35058-2
85	Left Magneto (LH Engine) Filter	63149
86	Left Magneto (LH Engine)	56IN51
87	Right Magneto (LH Engine) On-Off Switch	MS35058-2
88	Right Magneto (LH Engine) Filter	63149
89	Right Magneto (LH Engine)	56IN50
90	Resistor	75 ohm, 10 watt
91	Fixed Resistor	10F, 10 watt
92	LH Inboard Transmitter	50-369019
93	RH Inboard Transmitter	50-369019
94	Bond Jumper	AQ6Q
95	Fuel Panel Terminal Strip	6-140
96	Fuel Quantity Potentiometer	83-115-3158
97	Resistor (Type BW-1)	3300 ohm, 1 watt
98	Capacitor (500 MFD, 6 Volt)	BRH605A
99	Fuel Quantity Indicator	50-384001-15
100	Fuel Quantity Indicator	50-384001-21
101	LH Outboard Wing Terminal Strip	MS25123-2-10
102	Subpanel Terminal Strip	MS25123-2-20
103	RH Outboard Wing Terminal Strip	MS25123-2-10
104	RH Auxiliary Tank Fuel Quantity Transmitter	1518847
105	LH Auxiliary Tank Fuel Quantity Transmitter	1518847

Table 13-1. Equipment list (sheet 3 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
106	RH Auxiliary Tank Fuel Quantity Transmitter	1518414
107	LH Auxiliary Tank Fuel Quantity Transmitter	1518414
108	RH Auxiliary Tank Fuel Quantity Transmitter	1518540
109	LH Auxiliary Tank Fuel Quantity Transmitter	1519540
110	RH Subpanel Terminal Strip	MS25123-2-13
111	RH Oil Temperature Indicator Plug	MS3106-14S2S
112	LH Oil Temperature Indicator Plug	MS3106-14S2S
113	RH Oil Temperature Indicator	50-380012-3
114	LH Oil Temperature Indicator	50-380012-3
115	RH Oil Temperature Bulb Plug	MS3106-12S3S
116	LH Oil Temperature Bulb Plug	MS3106-12S3S
117	RH Oil Temperature Bulb	56B15
118	LH Oil Temperature Bulb	56B15
119	Cylinder Head Temperature Indicator Plug	MS3106-14S5S
120	Cylinder Head Temperature Indicator	50-380015-3
121	RH Cylinder Temperature Resistance Bulb	MS24482-1
122	LH Cylinder Temperature Resistance Bulb	MS24482-1
123	RH Fuel Boost Pump Selector Switch	50-369049
124	LH Fuel Boost Pump Selector Switch	50-369049
125	LH Subpanel Terminal Strip (LH Auxiliary Pump)	MS25123-2-4
126	RH Auxiliary Fuel Boost Pump Terminal Block	MS25123-2-2
127	LH Auxiliary Fuel Boost Pump Terminal Block	MS25123-2-2
128	RH Auxiliary Fuel Boost Pump	122723-112-01
129	LH Auxiliary Fuel Boost Pump	122723-112-01
130	RH Fuel Boost Pump Terminal Strip	MS25123-2-2
131	LH Fuel Boost Pump Terminal Strip	MS25123-2-2
132	RH Fuel Boost Pump	50-920073
133	LH Fuel Boost Pump	50-920073
134	LH Wing Terminal Strip	MS25123-2-5
135	RH Auxiliary Fuel Boost Pump Capacitor	AS185
136	LH Auxiliary Fuel Boost Pump Capacitor	AS185
137	RH Fuel Boost Pump Capacitor	AS185
138	LH Fuel Boost Pump Capacitor	AS185
139	RH Subpanel Terminal Strip (Carburetor Air Temperature Indicator)	MS25123-2-4
140	Carburetor Air Temperature Indicator Plug	MS106-14S5S
141	Carburetor Air Temperature Indicator	50-384010-5
142	RH Carburetor Air Temperature Bulb Plug	MS3106-12S3S
143	LH Carburetor Air Temperature Bulb Plug	MS3106-12S3S
144	RH Carburetor Air Temperature Bulb	MS28034-1
145	LH Carburetor Air Temperature Bulb	MS28034-1
146	RH Tachometer Generator	1001G01
147	LH Tachometer Generator	1001G01
148	RH Tachometer Generator Plug	MS3106-14S1S
149	LH Tachometer Generator Plug	MS3106-14S1S
150	RH Tachometer Indicator Plug	MS3106-14S1S
151	LH Tachometer Indicator Plug	MS3106-14S1S
152	RH Tachometer Indicator	50-380010-3
153	LH Tachometer Indicator	50-380010-3
154	Pitot Heat Switch	AN3022-2
155	Disconnect Splice	YZ14H1
156	Pitot Heat Tube	782-02
157	Landing Gear And Flap Indicator Circuit Breaker	D6761-1-3
158	Wing Flap Control Switch	35-364059

Table 13-1. Equipment list (sheet 4 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
159	Wing Flap Lower Limit Switch	50-361228
160	Wing Flap Upper Limit Switch	50-361229
161	Wing Flap Motor	35-521225
162	Navigation Lights On-Off Switch	8884K4
163	Wing Flap Light Dim Resistor	RW31F300
164	Disconnect Splice	YZ18H1
165	Wing Flap Up Position Light	2-3730-111
166	Wing Flap 20 Degree Down Light	2-3730-111
167	Wing Flap 30 Degree Down Light	2-3730-111
168	Wing Flap 20 Degree Down Light Switch	50-361227
169	Overhead Terminal Strip	AN3435-2-6
170	Fuel Panel Lights Rheostat	0150-351
171	Engine Instrument Lights Rheostat	0150-351
172	LH Subpanel Terminal Strip	MS25123-2-6
173	Instrument Light Socket	2505
174	Tab Indicator Light (Red)	MS25231R313
175	Fuel Panel Terminal Strip	6-140
176	Fuel Panel Light	MS25010-1
177	RH Panel Terminal Strip	MS25123-2-2
178	Instrument Panel Light	GB5408
179	Instrument Panel Light	GB5408M
180	Overhead Placard Light	MS25010-1A
181	Radio And Switch Panel Lights Rheostat	0318-351
182	Placard Lights	MS25010-1A
183	LH Subpanel Placard Light	MS25010-1A
184	RH Subpanel Placard Light	MS25010-1A
185	Resistor	RW31F251
186	Navigation Lights On-Off Flasher Switch	AN3022-3
187	Navigation Light Flasher	90-28
188	Left Wing Navigation Light	B6345-1-24
189	Right Wing Navigation Light	B6345-2-24
190	Tail Navigation Light	MS25219-1
191	Flight Instruments Rheostat	0150-351
192	LH Panel Terminal Strip	MS25123-2-6
193	LH Panel Terminal	MS25123-2-1
194	LH Panel Terminal Strip	MS25123-2-2
195	RH Panel Terminal Strip	MS25123-2-3
196	Instrument Panel Light	GB5408-1
197	Compass Light Cable Assembly	50-364196-3
198	Standby Compass	MS17983-T4
199	Turn And Slip Indicator Plug	MS3106R10SL3S
200	Turn And Slip Indicator	MS28024-1
201	Rotating Beacon Light Circuit Breaker	D6761-1-5
202	Rotating Beacon On-Off Switch	AN3022-2
203	Rotating Beacon Light	G7740-8-24
204	Passing Light On-Off Switch	AN3022-2
205	Passing Light	4591
206	RH Landing Light Switch	AN3022-2
207	LH Landing Light Switch	AN3022-2
208	RH Landing Light	4523
209	LH Landing Light	4523
210	Circuit Breaker Light Switch	MS25253-3
211	LH Circuit Breaker Panel Light Sockets	107-1930-931

Table 13-1. Equipment list (sheet 5 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
212	LH Circuit Breaker Panel Light Lamp	327
213	RH Circuit Breaker Panel Light Socket	107-1930-931
214	RH Circuit Breaker Panel Light Lamp	327
215	Nose Equipment Compartment Light	MS25123-2-6
216	Nose Equipment Compartment Light Socket	2011
217	Baggage Compartment Light Switch	MS25026-1
218	Baggage Compartment Light Socket	2011
219	Baggage Compartment Light	305
220	Overhead Reading Light Switch	8480K1
221	Overhead Reading Light	B2180
222	Map Light Rheostat	0149-351
223	Map Light	
224	Cabin Red Lights Rheostat	0149-351
225	Cabin Red Light Socket	MS35478-307
226	Cabin Red Light Lamp	2611
227	Cabin Door Actuator	MC7711
228	Cabin Door Actuator Switch	MS25026-1
229	Cabin Door And Step Light Socket	SC2611
230	Outside Step Lamp	311
231	Cabin Step Light	MS25238-301
232	Stall Warning Horn	1-02-000
233	Stall Warning Switch Heater	
234	Stall Warning Switch	168-2
235	Step Warning Light	50-364226
236	Step Up Indicator Switch	MS25026-1
237	Resistor	0600D
238	Resistor	4 1-2E
239	Pedestal Cigarette Lighter	LPA34087
240	LH Cigarette Lighter	LPA34087
241	RH Cigarette Lighter	LPA34087
242	Step Dynamic Brake Relay	814-180592
243	Step Slide Motor Assembly	50-364029
244	Step In Limit Switch	MS25026-1
245	Fuel Pressure Switch Plug	MS3106-14S-75
246	Step Fuel Pressure Selector Switch	410A33L324
247	RH Landing Gear Terminal Strip	MS25123-2-12
248	Cabin Door Actuator	MC7711
249	Step Key Lock Switch	35-364050-3
250	Step Up Safety Switch	YZRQ1T
251	Step Out Limit Switch	MS25008-1
252	Step Down Limit Transfer Switch	MS25026-1
253	Step Up Limit Switch	MS25008-1
254	Step Rotation Motor Assembly	50-364208
255	Heater Blower Circuit Breaker	MS25337-20
256	Air Valve Switch	MS25026-1
257	Landing Gear Control Switch	50-364235
258	Blower Motor Filter Capacitor	AS185
259	Blower Motor	50-554119
260	Terminal Strip	MS25123-2-7
261	Fuse	NAS441-3-5
262	Resistor	3 ohm, 10 watt
263	High Heat Thermostat	112447SICC300T
264	Relay Control Box Assembly	51B542

Table 13-1. Equipment list (sheet 6 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
265	Cabin Temperature Selector Rheostat	50-334014-1
266	Cabin Thermostat	50-554003-3
267	Cyclic Thermostat	122447BRCC5
268	Fuel Valve	12257-24
269	Fuel Pump	476439
270	Ignitor	1C
271	Heater Cable	50-364127
272	Heater	50-555115
273	Anti-Ice Circuit Breaker	D6761-1-5
274	Anti-Ice Pump Rheostat	0317-351
275	Resistor	75 ohm, 10 watt
276	Anti-Ice Pump Plug	MS3106-10S2S
277	Anti-Ice Pump	AN6100-1
278	Anti-Ice Quantity Indicator	50-384001-23
279	Anti-Ice Transmitter Potentiometer	43C2-15K
280	Anti-Ice Transmitter	50-369050
281	Deicer System Circuit Breaker	D6761-1-10
282	Electronic Timer Plug	MS3106A22-14S
283	Electronic Timer Plug Adapter	MS3057-12A
284	Deicer On-Off Switch	MS35058-3
285	Deicer Circuit Terminal Strip	MS20659-1
286	Deicer Separator Unit Plug	MS3106A14S9S
287	Deicer Separator Unit Plug Adapter	MS3057-6A
288	Tail Boot Distribution Valve Plug	MS3106A14S7S
289	Tail Boot Distribution Valve Plug Adapter	MS3057-6A
290	RH Inboard Boot Distribution Valve Plug	MS3108A14S7S
291	RH Inboard Boot Distribution Valve Plug Adapter	MS3057-6A
292	RH Outboard Boot Distribution Valve Plug	MS3108A14S7S
293	RH Outboard Boot Distribution Valve Plug Adapter	MS3057-6A
294	LH Inboard Boot Distribution Valve Plug	MS3108A14S7S
295	LH Inboard Boot Distribution Valve Plug Adapter	MS3057-6A
296	LH Outboard Boot Distribution Valve Plug	AN3106A14S7S
297	LH Outboard Boot Distribution Valve Plug Adapter	MS3057-6A
298	Landing Gear Position Light	1625 or A5175-327 (Red Filter)
299	Down Light Dimming Resistor	RW31F251
300	RH Landing Gear Indicator Light	VM911M7
301	Nose Landing Gear Indicator Light	VM911M7
302	LH Landing Gear Indicator Light	VM911M7
303	Nose Landing Gear Terminal Strip	MS25123-2-4
304	LH Landing Gear Terminal Strip	MS25123-2-7
305	Landing Gear Control Circuit Breaker	D6761-1-3
306	RH Subpanel Bus Bar	50-344446-1
307	Resistor	RW31F101
308	Landing Gear Warning Flasher	611 (600 MA)
309	Landing Gear Warning Horn	318
310	Landing Gear Warning Light	AN5839-1
311	Warning Horn Silencer Relay	MH5D
312	Warning Horn Silencer Switch	9095
313	Landing Gear Warning Light Test Switch	9095
314	RH Throttle Switch	V3-1
315	LH Throttle Switch	V3-1
316	Landing Gear Control Up Limit Switch	MS25026-15WMC2711 Actuator

Table 13-1. Equipment list (sheet 7 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
317	Landing Gear Control Down Limit Switch	MS25026-15WMC2711 Actuator
318	LH Landing Gear Down Lock Switch	MS25011-1
319	RH Landing Gear Safety Switch	MS25011-1
320	RH Landing Gear Down Lock Switch	MS25011-1
321	RH Landing Gear Up Lock Switch	MS25011-1
322	Landing Gear Control Relay	6046H39A
323	Landing Gear Retract Motor	50-810146
324	Nose Landing Gear Down Lock Switch	MS25011-1
325	Nose Landing Gear Up Lock Switch	MS25011-1
326	LH Landing Gear Up Lock Switch	MS25011-1
327	Landing Gear Safety Switch	MS25383-1
328	Terminal	36906
329	Battery Switch	50-364145
330	24 Volt Battery	MA7 or CA7
331	Battery Connector	MS25182-1
332	External Power Receptacle	AN2552-6A
333	Battery Master Switch	MS35058-3
334	Battery Relay	MS24183D1
335	Battery Relay Bus Bar	50-361213
336	Main Belly Terminal Post	814-180537
337	RH Starter Relay	MS24183D1
338	LH Starter Relay	MS24183D1
339	RH Generator Circuit Breaker	PDLM105
340	LH Generator Circuit Breaker	PDLM105
341	Landing Gear Circuit Breaker	PDLM50
342	Threshold Light Circuit Breaker	D7271-1-5
343	Circuit Breaker Bus Bar	50-369101-13
344	Overhead Lights Circuit Breaker	D7271-1-5
345	Control Panel Light Circuit Breaker	D7271-5-5
346	Circuit Breaker Bus Bar	50-369101-5
347	LH Landing Light Circuit Breaker	D7270-5-15
348	RH Landing Light Circuit Breaker	D7270-5-15
349	Circuit Breaker Bus Bar	50-369101-7
350	Navigation Light Circuit Breaker	D7270-5-5
351	Taxi Light Circuit Breaker	D7270-5-15
352	Beacon Light Circuit Breaker	D7270-5-10
353	Circuit Breaker Bus Bar	50-369101-7
354	Flight Instrument Circuit Breaker	D7271-1-5
355	Engine Instrument Lights Circuit Breaker	D7271-1-5
356	Heater Blower Circuit Breaker	D7270-5-20
357	Heater Control Circuit Breaker	D7270-5-5
358	Circuit Breaker Bus Bar	50-369101-1
359	Air Filter Circuit Breaker	D7271-1-5
360	Wing Flap Motor Circuit Breaker	D7271-1-15
361	Propeller Anti-Icer Circuit Breaker	D7271-1-15
362	Wing Flap And Landing Gear Indicator Circuit Breaker	D7271-1-5
363	Temperature Indicator Circuit Breaker	D7271-1-5
364	Circuit Breaker Bus Bar	50-369101-3
365	Turn And Slip Indicator Circuit Breaker	D7271-1-5
366	Fuel Quantity Indicator Circuit Breaker	D7271-1-5
367	RH Fuel System Circuit Breaker	D7271-1-10
368	LH Fuel System Circuit Breaker	D7271-1-10

Table 13-1. Equipment list (sheet 8 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
369	Pitot Heat Circuit Breaker	D7270-5-15
370	RH Idle Cut Off Switch	MS35058-3
371	LH Idle Cut Off Switch	MS35058-3
372	Cabin Light Circuit Breaker	D7271-1-10
373	Prime And Start Circuit Breaker	D7271-1-5
374	Warning Horn Circuit Breaker	D7271-1-5
375	Landing Gear Relay Circuit Breaker	D7271-1-5
376	Utility Light Circuit Breaker	D7271-1-5
377	Cigarette Lighter Circuit Breaker	D7271-1-15
378	Cabin Door Warning Light Circuit Breaker	D7271-1-5
379	Windshield Wiper Circuit Breaker	
380	RH Voltammeter	50-380014-1
381	RH Ammeter Shunt	4142341G83
382	RH Reverse Current Relay	AN3025-300
383	RH Voltage Regulator	1589-1C
384	RH Generator Equalizer Resistor	1002
385	RH Generator Switch	MS35059-3
386	RH Firewall Plug	MS3106B32-6S
387	RH Firewall Receptacle	MS3100-32-6P
388	LH Electric Chip Detector	281048-041-5
389	RH Generator	3059-002
390	RH Electric Chip Detector	281048-041-5
391	LH Chip Detector Indicator Light	MS25041-8-327
392	LH Generator	3059-002
393	RH Chip Detector Indicator Light	MS25041-8-327
394	LH Firewall Plug	MS3106B32-6S
395	LH Firewall Receptacle	MS3100-32-6P
396	LH Generator Switch	MS35059-3
397	LH Generator Equalizer Resistor	1002
398	LH Voltage Regulator	1589-1C
399	LH Reverse Current Relay	AN3025-300
400	LH Ammeter Shunt	4142341G83
401	LH Voltammeter	50-380014-1
402	Engine Priming Switch	138143
403	Engine Starting Switch	138143E
404	Engine Selector Switch	MS35059-1
405	RH Engine Primer	10-407
406	RH Engine Starting Motor	G760
407	LH Engine Starting Motor	G760
408	LH Engine Primer	10-407
409	Magneto Switch Bus Bar	50-369101-9
410	Magneto Switches	MS35058-2
411	RH Engine Right Magneto Filter	705535 Type MF 3
412	RH Engine Right Magneto	10-51365-38
413	RH Engine Left Magneto Filter	705535 Type MF 3
414	RH Engine Left Magneto	10-51365-34
415	LH Engine Right Magneto Filter	705535 Type MF 3
416	LH Engine Right Magneto	10-51365-34
417	LH Engine Left Magneto Filter	705535 Type MF 3
418	LH Engine Left Magneto	1051365-33
419	RH Oil Temperature Bulb	MS28034-1
420	RH Oil Temperature Bulb Plug	MS3106B12S3S
421	RH Oil Temperature Indicator Plug	MS3106B14S2S

Table 13-1. Equipment list (sheet 9 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
422	RH Oil Temperature Indicator	AN5773-1A
423	LH Oil Temperature Indicator	AN5773-1A
424	LH Oil Temperature Indicator Plug	MS3106B14S2S
425	LH Oil Temperature Bulb Plug	MS3106B12S3S
426	LH Oil Temperature Bulb	MS28034-1
427	RH Engine Cylinder Head Temperature Transmitter	MA1
428	Cylinder Head Temperature Indicator Plug	MS3106B14S5S
429	Dual Engine Cylinder Head Temperature Indicator	202-2F1F1A
430	LH Engine Cylinder Head Temperature Transmitter	MA1
431	RH Engine Tachometer Generator	MS25038-2
432	RH Tachometer Generator Plug	MS3106B10SL3S
433	RH Tachometer Indicator Plug	MS3106B14S1S
434	Dual Tachometer Indicator	AN5530-30-2A12
435	LH Tachometer Indicator Plug	MS3106B14S1S
436	LH Tachometer Generator Plug	MS3106B10SL3S
437	LH Engine Tachometer Generator	MS25038-2
438	Fuel Panel Terminal Strip	6-140
439	Fuel Crossfeed Switch	MS35059-3
440	Fuel Crossfeed Indicator	MS25041-3
441	Fuel Crossfeed Valve	50-924027
442	Fuel Crossfeed Valve Plug	MS3106B14S5S
443	Fuel Quantity Indicator Resistor	75 ohm, 10 watt
444	Fuel Quantity Indicator Resistor	75 ohm, 10 watt
445	Fuel Quantity Indicator Resistor	7-5 K 10 watt
446	Fuel Quantity Indicator Resistor	7-5 K 10 watt
447	LH Main (Inboard) Fuel Tank Indicator	50-384001-15
448	RH Main (Inboard) Fuel Tank Indicator	50-384001-15
449	RH Auxiliary (Outboard) Fuel Tank Indicator	50-384001-17
450	LH Auxiliary (Outboard) Fuel Tank Indicator	50-384001-17
451	Fuel Quantity Indicator Capacitor	0.0005 MFD, 6 volt PRH605A
452	Fuel Quantity Indicator Resistor	3300 ohm, 1 watt BW1
453	Fuel Quantity Indicator Capacitor	500 MFD, 6 volt PRH605A
454	Fuel Quantity Indicator Resistor	3300 ohm, 1 watt BW1
455	Fuel Quantity Indicator Potentiometer	83-1115-3158
456	Fuel Quantity Indicator Potentiometer	83-1115-3158
457	Fuel Quantity Indicator Potentiometer	83-1115-3158
458	Fuel Quantity Indicator Potentiometer	83-1115-3158
459	RH Wing Terminal Strip	MS25123-2-10
460	RH Auxiliary Fuel Cell Transmitter (Aft Outboard)	1518847
461	RH Auxiliary Fuel Cell Transmitter (Aft Inboard)	1518414
462	RH Fuel Level Transmitter (Forward Auxiliary)	1518540
463	Bond Jumper	AQ6Q
464	RH Inboard Fuel Level Transmitter	50-369019
465	Bond Jumper	AQ3P
466	LH Inboard Fuel Level Transmitter	50-369019
467	Bond Jumper	AQ3P
468	LH Wing Terminal Strip	MS25123-2-10
469	LH Auxiliary Fuel Cell Transmitter (Aft Outboard)	1518847
470	LH Auxiliary Fuel Cell Transmitter (Aft Inboard)	1518414
471	LH Fuel Level Transmitter (Forward Auxiliary)	1518540
472	Bond Jumper	AQ6Q
473	RH Fuel Boost Pump Switch	50-369049
474	RH Auxiliary Boost Pump Terminal Block	MS25123-2-2

Table 13-1. Equipment list (sheet 10 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
475	Filter Capacitor (RH Auxiliary Boost Pump)	AS185
476	RH Auxiliary Boost Pump	122723-112-01
477	RH Boost Pump Terminal Block	MS25123-2-2
478	Filter Capacitor (RH Boost Pump)	AS185
479	RH Boost Pump	122723-112-01
480	Pedestal Terminal Strip	MS25123-2-7
481	Switch Actuator	JV-26
482	Switch	MS25253-1
483	Fuel Enrichment Indicator Light	MS25041-3
484	Fuel Enrichment Solenoid Valve	AV1A1107
485	Fuel Enrichment Solenoid Valve Plug	MS3106B10SL4S
486	Purge Switch (RH)	50-369041-27
487	Fuel Solenoid	AV1A1107
488	Fuel Solenoid Valve Plug	MS3106B10SL4S
489	LH Fuel Boost Pump Switch	50-369049
490	LH Auxiliary Boost Pump Terminal Block	MS25123-2-2
491	Filter Capacitor (LH Auxiliary Boost Pump)	AS185
492	LH Auxiliary Boost Pump	122723-112-01
493	LH Boost Pump Terminal Block	MS25123-2-2
494	Filter Capacitor (LH Boost Pump)	AS185
495	LH Boost Pump	122723-112-01
496	Switch Actuator	JV26
497	Switch	MS25253-1
498	Fuel Enrichment Indicator Light	MS25041-3
499	Fuel Enrichment Solenoid Valve	AV1A1107
500	Fuel Enrichment Solenoid Valve Plug	MS3106B10SL4S
501	Purge Switch (LH)	50-369041-27
502	Fuel Solenoid	AN1A1107
503	Fuel Solenoid Plug	MS3106B10SL4S
504	Landing Gear Control Switch	AN3227-3
505	Air Filter Control Switch	4AT4
506	RH Filter Indicator	MS25041-3
507	RH Ram Indicator	MS25041-4
508	RH Air Filter Motor Terminal Strip	MS25123-2-5
509	Deleted	
510	Deleted	
511	Deleted	
512	Deleted	
513	LH Air Filter Motor Terminal Strip	MS25123-2-5
514	LH Filter Indicator	MS25041-3
515	LH Ram Indicator	MS25041-4
516	Wing Flap Position Transmitter Plug	MS3106B14S2S
517	Wing Flap Position Transmitter	AN5786-1
518	Wing Flap Position Indicator Plug	MS3106B10SL3S
519	Wing Flap Position Indicator	MS28023-1
520	Wing Flap Control Switch	AN3022-2
521	Wing Flap Upper Limit Switch	50-361265
522	Wing Flap Lower Limit Switch	50-361228-4
523	Wing Flap Drive Motor	50-364090
524	Overhead Panel Terminal Strip	MS25123-2-4
525	Engine And Radio Lights Dimming Rheostat	0318-351
526	Engine Instruments And Radio Lights Terminal Strip	MS25123-2-3

Table 13-1. Equipment list (sheet 11 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
527	Engine Instrument Light	AN8970-2-327
528	Subpanel And Tab Dimming Rheostat	0317-351
529	RH Subpanel Edge Light	MS25010-3A
530	Instrument Light	AN8970-1-327
531	Pedestal Edge Light	MS25010-3A
532	LH Subpanel Edge Light	MS25010-3A
533	Overhead Panel Edge Light	MS25010-3A
534	Fuel And Overhead Dimming Rheostat	0150-351
535	Map Light Dimming Rheostat	0149-351
536	Cockpit Red Light Dimming Rheostat	0316-351
537	Map Light	AN3122-1524
538	Map Light Socket	2806
539	Cockpit Red Light	MS35478-307
540	Cockpit Red Light Socket	2611
541	Fuel Panel Edge Light	MS25010-3A
542	Magnetic Compass Light	MS25237-327
543	RH Flight Instrument Light	AN8970-2-327
544	RH Flight Instrument Light	AN8970-2-327
545	RH Flight Instrument Light Terminal Strip	MS25123-2-7
546	Oxygen Quantity Indicator Light	AN8970-1-327
547	Free Air Temperature Light Switch	MS25089-3C
548	Free Air Temperature Light	MS25010-3A
549	LH Flight Instrument Light Terminal Strip	MS25123-2-4
550	LH Flight Instrument Light	AN8970-1-327
551	LH Flight Instrument Light	AN8970-1-327
552	Disconnect Splice	32445
553	RH Wing Navigation Light	B6345-2-24
554	Tail Navigation Light	MS25219-4
555	LH Wing Navigation Light	V6345-1-24
556	Taxi Light	AN3176-1
557	Disconnect Splice	32445
558	Disconnect Splice	32445
559	Disconnect Splice	32445
560	Disconnect Splice	32445
561	Permanent Splice	35203
562	Threshold Light Switch	AN3209-3
563	Permanent Splice	35203
564	Threshold And Lower Baggage Light	MS25231-313
565	Permanent Splice	35203
566	Cabin Door Switch	MS25253-1
567	Threshold Light Socket	2506
568	Cabin Main Light Switch	MS35058-3
569	RH Forward Dome Light Permanent Splice	35203
570	RH Forward Dome Light	MS25231-313
571	RH Forward Dome Light Socket	2505
572	RH Aft Dome Light Permanent Splice	35203
573	RH Aft Dome Light	MS25231-313
574	RH Aft Dome Light Socket	2505
575	LH Forward Dome Light Permanent Splice	35203
576	LH Forward Dome Light	MS25231-313
577	LH Forward Dome Light Socket	2505
578	LH Aft Dome Light Permanent Splice	35203
579	LH Aft Dome Light	MS25231-313

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ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
580	LH Aft Dome Light Socket	2505
581	RH Forward Reading Light Switch	AN3209-3
582	RH Forward Reading Light	MS25232-307
583	RH Forward Reading Light Socket	2611
584	RH Aft Reading Light Switch	AN3209-3
585	RH Aft Reading Light	MS35478-307
586	RH Aft Reading Light Socket	2611
587	LH Forward Reading Light Switch	AN3209-3
588	LH Forward Reading Light	MS35478-307
589	LH Forward Reading Light Socket	2611
590	LH Aft Reading Light Switch	AN3209-3
591	LH Aft Reading Light	MS35478-307
592	LH Aft Reading Light Socket	2611
593	LH Microphone Terminal Strip	MS25123-1-16
594	LH Utility Light	D6810A
595	RH Microphone Terminal Strip	MS25123-1-16
596	RH Utility Light	D6810A
597	Cabin Door Warning Light	MS25041-8
598	Diode	F6
599	Cabin Sign Indicator Switch	MS35059-1
600	Cabin Sign Light (No Smoking)	1625 or A7165-1-327
601	Cabin Sign Light (No Smoking)	1625 or A7165-1-327
602	Cabin Sign Light (Fasten Seat Belt)	1625 or A7165-1-327
603	Cabin Sign Light (Fasten Seat Belt)	1625 or A7165-1-327
604	Cigarette Lighter Resistor	LZ27591
605	Cigarette Lighter	LPA27630
606	Disconnect Splice	33197
607	RH Landing Light	4523
608	LH Landing Light	4523
609	Disconnect Splice	33197
610	Turn-And-Slip Indicator Plug	MS3106B10SL3S
611	Turn-And-Slip Indicator	MS28024-3
612	Pitot Tube Disconnect	33197
613	Pitot Tube Heat Element	782-02
614	Stall Warning Switch And Heater	168-2
615	Stall Warning Horn	1-02-000S
616	Stall Warning Switch Disconnect	32445
617	Vertical Stabilizer Beacon Light Plug	MS3106B10SL3S
618	Vertical Stabilizer Beacon Light	G7740-8-24
619	Belly Beacon Light	G7740-7-24
620	Belly Beacon Light Plug	MS3106B10SL3S
621	Disconnect Splice	32445
622	Anti-Icer Fluid Level Transmitter	50-369050
623	Anti-Icer Fluid Level Indicator	50-384001-23
624	Anti-Icer Indicator Adjustment Potentiometer	43C2-15K
625	Propeller Anti-Icer Rheostat	0317-351
626	Propeller Anti-Icer Pump Plug	MS3106B10SL2S
627	Propeller Anti-Icer Pump	AN6100-1
628	Windshield Anti-Ice Switch	MS25059-6
629	Windshield Anti-Ice Solenoid	10-408
630	RH Landing Gear Up Lock Switch	MS25011-1
631	RH Landing Gear Down Lock Switch	MS25011-1
632	RH Wheel Well Terminal Strip	MS25123-2-12

Table 13-1. Equipment list (sheet 13 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
633	RH Landing Gear Position Indicator Plug	CA06B10SL3S
634	RH Landing Gear Position Indicator	AN5839-1
635	RH Engine Throttle Switch	MS25253-1
636	LH Engine Throttle Switch	MS25253-1
637	Nose Landing Gear Up Lock Switch	MS25011-1
638	Nose Landing Gear Down Lock Switch	MS25011-1
639	Nose Wheel Well Terminal Strip	MS25123-2-10
640	Nose Landing Gear (Position Indicator)	AN5839-1
641	Nose Landing Gear Position (Indicator Plug)	CA06B10SL3S
642	Landing Gear Control Switch (Handle Light)	MS25237R327
643	Handle Light Test Switch	MS25089-3C
644	LH Landing Gear Up Lock Switch	MS25011-1
645	LH Landing Gear Down Lock Switch	MS25011-1
646	LH Wheel Well Terminal Strip	MS25123-2-12
647	LH Landing Gear Position Indicator Plug	CA06B10SL3S
648	LH Landing Gear Position Indicator	AN5839-1
649	RH Landing Gear Up Lock Switch Actuator	AN3168-2
650	RH Landing Gear Down Lock Switch Actuator	50-361234
651	RH Engine Throttle Switch Actuator	JV5
652	LH Engine Throttle Switch Actuator	JV5
653	Nose Landing Gear Up Lock Switch Actuator	AN3168-1
654	Nose Landing Gear Down Lock Switch Actuator	50-361234
655	LH Landing Gear Up Lock Switch Actuator	AN3168-2
656	LH Landing Gear Down Lock Switch Actuator	50-361234
657	Landing Gear Control Relay	6046H39A
658	Landing Gear Drive Motor	50-810146
659	Landing Gear Up Limit Switch	MS25026-1
660	Landing Gear Down Limit Switch	MS25026-1
661	Landing Gear Safety Switch	MS25011-1
662	Landing Gear Up Limit Switch Actuator	MC2711
663	Landing Gear Down Limit Switch Actuator	MC2711
664	Horn Silencer Switch	MS25089-3C
665	Horn Silencer Relay	MH5D
666	Landing Gear Warning Horn	MS25222-1
667	Flasher Resistor	RW28G101
668	Flasher	624
669	Landing Gear Safety Switch	MS25011-1
670	Blower Control Relay	AN3320-1
671	Heater Blower Motor	M4861H1A
672	Cabin Heat Control Rheostat	0154
673	Heat Control Selector Switch	AN3021-3
674	Sensing Element Plug	MS3106B12S3S
675	Outside Air Sensing Element	AYLF2336-2
676	Sensing Element Plug	MS3106B14S2S
677	Heater Discharge Air Sensing Element	AYLF3001-1
678	Cabin Air Sensing Element	BYLF5305
679	Heater Control Box	CYLF5346
680	Heater Control Box Plug	MS3106B181S
681	Heater Temperature Limit Switch	J56A80
682	Heater Control Switch	MS35059-3
683	LH Solenoid Plug	MS3106B10SL4S
684	LH Fuel Solenoid	AV1B1474
685	Igniter Plug	MS3106B10SL3S

Table 13-1. Equipment list (sheet 14 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
686	Igniter	11C30
687	Heater Fuel Solenoid Plug	MS3106B10SL4S
688	Heater Fuel Solenoid	AV1B1474
689	Heater Resistor	D200L 3 ohm, 25 watt
690	Fuse	MTH5
691	RH Solenoid Plug	MS3106B10SL4S
692	LH Flight Instrument Dimming Rheostat	AN8970-1-327
693	Wing Flap Control Relay	AN3320-1
694	Heater Overtemp Switch	AH56A80
695	Cockpit Heat Control Rheostat	0154
696	Landing Gear Position Light	1625
697	Engine Instrument And Radio Lights	MS25123-2-7
698	Propeller Anti-Icer Resistor	
699	Windshield Wiper Motor Plug	MS3106B10SL3S
700	Windshield Wiper Motor	XW20173-M2
701	Windshield Wiper Circuit Breaker	D7271-1-10
702	Windshield Wiper Switch	XW20336-1
703	Resistor	W20538-100
704	Resistor	W20538-100
705	Windshield Wiper Switch	XW20574-1
706	Variable Resistor	Type 1A
707	Inverter	1-100A-115D-7
708	Plug	MS3106-14S-7S
709	Gyroscope	MD-1
710	Attitude Indicator	MM-3A
711	Gyroscope	MC-1
712	Inverter	1-100-115D-7
713	Terminal Strip	MS25123-1-9
714	Plug	MS3106-14S-7S
715	Circuit Breaker	D7270-5-15
716	Relay	44B18574
717	Relay	MS24149D2
718	Plug	MS3106A-14S-55
719	Plug	PTO-6P-14-19S
720	Plug	MS3106A-24-28S
721	Step Dynamic Brake Relay	
722	Circuit Breaker Bus Bar	50-369101-3
723	Circuit Breaker	D7271-1-5
724	Electronic Timer	42E09-9-A
725	Electronic Timer Plug	PC06E-14-19S
726	Combination Unit	38E28-1-A
727	Combination Unit Plug Adapter	MS3057-6B
728	Combination Unit Plug	MS3106A14S-9S
729	LH Wing Distribution Valve	1532-3-A
730	LH Wing Distribution Valve Plug Adapter	MS3057-6B
731	LH Wing Distribution Valve Plug	MS3106A14S-7S
732	RH Wing Distribution Valve	1532-3-A
733	RH Wing Distribution Valve Plug Adapter	MS3057-6B
734	RH Wing Distribution Valve Plug	MS3106A14S7S
735	Tail Distribution Valve	1532-3-A
736	Tail Distribution Valve Plug Adapter	MS3057-6B
737	Tail Distribution Valve Plug	MS3106A14S-7S
738	Switch	13AT3

Table 13-1. Equipment list (sheet 15 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
739	Switch	MS35059-3
740	Inverter On-Off Circuit Breaker	D7271-1-5
741	Terminal Board	MS25123-3-3
742	Bus Bar	50-364295-1
743	RH Generator Circuit Breaker	CLM120
744	RH Firewall Plug	MS3100-28-22P
745	RH Firewall Receptacle	MS3106B-28-22S
746	RH Generator	30059-002
747	LH Generator Circuit Breaker	CLM120
748	LH Firewall Plug	MS3100-28-22P
749	LH Firewall Receptacle	MS3106B-28-22S
750	LH Generator	30059-002
751	Torso Tank Circuit Breaker Switch	D7270-5-5
752	Torso Tank Pump Receptacle	MS3102E-12S-3S
753	Connector	MS3106E-8S-1S
754	Torso Tank Valve	5252
755	Relay	MH11DJ
756	Fuse	AGX-1/2
757	Magnetic Chip Detector Circuit Breaker	D7271-1-5
758	Phase I Inverter Power Supply Circuit Breaker	D6761-1-10
759	Inverter On-Off Switch	AN3022-1
760	Inverter (Main)	1-101A-115S-7
761	Relay	MS24149D1
762	Inverter (Spare)	1-101A-115S-7
763	Junction Box	50-340011-53
764	Hood Assembly Connector	2Z3046.86
765	Hood Assembly Connector	2Z3046.86
766	Pilot Signal Distribution Panel	SB329/AR
767	Copilot's Signal Distribution Panel	SB329/AR
768	Pilot's Microphone Wheel Switch	MS25089-3C
769	Copilot's Microphone Wheel Switch	MS25089-3C
770	Pilot's Microphone Foot Switch	MS25039-1
771	Copilot's Microphone Foot Switch	MS25039-1
772	Pilot's Jack	3B
773	Copilot's Jack	3B
774	Headset Terminal Cover	50-340011-229
775	Pilot's Headset Terminal Block	MS25123-2-6
776	Copilot's Headset Terminal Block	MS25123-2-6
777	Pilot's Microphone Cord	WF14/U
778	Copilot's Microphone Cord	WF14/U
779	Pilot's Telephone Jack	U-92(A)/U
780	Copilot's Telephone Jack	U-92(A)/U
781	FM Switch - Emergency Microphone and Headset Switch	AN3022-2
782	Transformer	4350
783	Relay	650-5136
784	Junction Box	Type J-10
785	Resistor	220 ohm, 1 watt, 5% or 10%
786	Resistor	120 ohm 1/2 watt, 10%
787	Junction Box	Type J-10
788	RH Subpanel Bus Bar	50-344446-3
789	Marker Light	MS25331-4
790	Glide Slope Panel Light Rheostat	AN3155-50-50
791	Dynamotor Switch Circuit Breaker	D6761-1-10

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ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
792	Marker Audio Variable Resistor	8487
793	Marker Light Circuit Breaker	D8761-1-3
794	Circuit Breaker	D8761-1-5
795	Connector	MRE-34H -2203
796	Plug	UI-34F32/12RG
797	Control Head	C1514/A
798	Relay	AN3320-2
799	Radio Compass Receiver	R-101B/ARN-6
800	Mounting	MT274C/ARN-6
801	Resistor	330 ohm, 1/2 watt
802	Plug	MS3106-14S-25
803	Adapter	MS3057-6B
804	Indicator	ID-918/ARN-6
805	Plug	MS3108-16S-1S
806	Adapter	MS3057-8B
807	Loop Assembly	AS-313B/ARN-6
808	Coaxial Cable Assembly	CG-131/ARN-6
809	Coaxial Cable Assembly	CG-405/ARN-6
810	Coupling Unit	CU-65/ARN-6
811	Sense Antenna	50-344397
812	R-122/ARN-12 Radio Receiver	R-122/ARN-12
813	Radio Receiver Mounting	MT-589/ARN-12
814	Adapter	MS3057-10
815	Connector	MS3108-18-9S
816	Plug	PL259-A
817	Coaxial Cable	RG-8/U
818	Connector	UG-573/U
819	Marker Antenna	AT-640/ARN
820	Omni 1 Circuit Breaker	D8761-1-5
821	Power Plug	14321
822	Plug	14050
823	Plug	14050
824	Converter Plug	15912
825	Rack	MT-1175/ARN-30A
826	Converter	CV-265/ARN-30A
827	Mount	MT-1174/ARN-30A
828	Omni Receiver No. 1	R-445/ARN-30
829	Plug	UG-274C/U
830	Plug	UG-88C/U
831	Coaxial Cable	RG-58C/U
832	Antenna	AS-580A/ARN-30
833	Control	D-1254/ARN-30
834	Indicator Plug	14320
835	Indicator	ID-453/ARN-30
836	Plug	UG-88C/U
837	Plug	UG-88C/U
838	Omni 2 Circuit Breaker	D8761-1-5
839	Power Plug	14321
840	Plug	14050
841	Plug	14050
842	Converter Plug	15912
843	Rack	MT-1175/ARN-30A
844	Converter	CV-265/ARN-30A

Table 13-1. Equipment list (sheet 17 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
845	Mount	MT-1174/ARN-30A
846	Omni Receiver No. 2	R-445/ARN-30
847	Plug	UG-88C/U
848	Control	C-1254/ARN-30
849	Plug	14320
850	Indicator	ID-453/ARN-30
851	Plug	UG-88C/U
852	Coaxial Cable	RG-58C/U
853	Switch	AN3022-2
854	Hood Assembly Connector	2Z3081.31
855	Dynamotor	DY107/AR
856	Mount	MT-1267/AR
857	Hood Assembly Connector	2Z3046.86
858	FM Control	SB-327/ARC-44
859	Hood Assembly Connector	2Z3046.87
860	Mount	MT-1268/AR
861	FM Transceiver	RT-294/ARC-44
862	Plug	UG-88C/U
863	Coaxial Cable	RG-58C/U
864	Antenna	AT-454/ARC
865	Squelch Switch	AN3022-2
866	Plug	UG-88C/U
867	RH Subpanel Bus Bar	50-364240
868	RH Subpanel Bus Bar	50-344491-3
869	Transceiver Circuit Breaker	D6761-1-25
870	Plug	MS3108B-24-7S
871	Adapter	MS3057-16
872	Plug	MS3108B-24-5S
873	Mount	MT-1536/ARC-55
874	Transceiver	RT-349/ARC-55
875	Connector	UG-536C/U
876	Coaxial Cable	RG-58C/U
877	Plug	UG-88C/U
878	Antenna	AT-450/ARC-45
879	End Bell	K06-21 5/8
880	Plug	K03-21-30SN
881	Control Panel	C-1827/ARC-55
882	Adapter	MS3057-16
883	Glide Slope Receiver Circuit Breaker	D6761-1-3
884	Glide Slope Control	C-2065/AR
885	Glide Slope Receiver	R-746()/AR
886	Mount	MT-1762/ARN
887	Connector	UG-536C/U
888	Coaxial Cable	RG-58C/U
889	Plug	UG-88C/U
890	Resistor	1,000 ohm, 1 watt, 5%
891	Capacitor	3NDC, 1250 mfd
892	Resistor	1200 ohm, 1 watt, 5% or 10%
893	Resistor	1800 ohm, 1 watt, 5% or 10%
894	Capacitor	47 mfd, 100 or 200 vdc
895	Resistor	1,000 ohm, 1/2 watt, 5% or 10%
896	Resistor	27 ohm, 1/2 watt, 5% or 10%
897	Resistor	220 ohm, 1 watt, 10%

Table 13-1. Equipment list (sheet 18 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
898	Resistor	120 ohm, 1/2 watt, 10%
899	Circuit Breaker	D6761-1-10
900	Circuit Breaker	D6761-1-3
901	Plug	MS3106-20-11S
902	Gyrosyn Amplifier	653895
903	Cut-Out Switch	MS25103-2
904	Plug	721966
905	Gyrosyn Indicator	653894-2, C-2A
906	Junction Box	661847
907	Flux Valve	656520
908	Relay	MS24149D2
909	Switch	AN3022-1
910	Plug	MS3106-14S-7S
911	Inverter	1-100A-115D-7
912	Plug	MS3106-14S-7S
913	Inverter	1-100A-115D-7
914	Junction Box	50-344520
915	Plug	MS3106-14S-7S
916	Adapter	MS3057-6
917	Plug	MS3106-14S-7S
918	Adapter	MS3057-6
919	Relay	44B18574
920	Light Assembly	MS25331-8
921	Headset Terminal Cover	50-340017-87
922	Transformer	A4350
923	Glide Slope Panel Light Rheostat	5524-H3
924	Marker Light Circuit Breaker	D6761-1-5
925	Light Assembly	MS25010-3A
926	Power Plug	14491
927	Rack	E-17
928	Control	C-1254A/ARN-30
929	Plug	UG-88C/U
930	Plug	UG-88C/U
931	Plug	16742
932	Power Unit	DY-150/ARN
933	Mount	MT-1913/ARN
934	Plug	16115
935	Receiver	R-836/ARN-59
936	Mount	MT-1912/ARN
937	Coaxial Cable	17984
938	Sense Antenna	50-344448
939	Feed Through Insulator	19077
940	Cable Assembly	17985
941	Plug	19062
942	Loop Antenna	AT-780/ARN-59
943	Plug	14491
944	Indicator	ID-637/ARN
945	Plug	16115
946	Control Unit	C-2275/ARN
947	Connector	MM5-11-5/16
948	Receiver	R-666()/ARN-32
949	Mount	MT-1546()/ARN
950	Connector	UG-88C/U

Table 13-1. Equipment list (sheet 19 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
951	Coaxial Cable	RG-58C/U
952	Connector	UG-88()/U
953	Antenna	AT-640A/ARN
954	Adapter	UG-273/U
955	Circuit Breaker	D6761-1-5
956	Frequency Selector Switch	12004-7
957	Sidetone Relay	5424-HS-23
958	Plug	14050
959	Plug	14052
960	Plug	14051
961	VHF Transmitter	T-366()/ARC
962	Transmitter Mount	MT-1142()/ARC
963	Plug	UG-88C/U
964	Coaxial Cable	RG-58C/U
965	Plug	16115
966	Oscillator Relay	50-340017-123
967	Mounting	MT-1677/AR
968	Plug	UG-88C/U
969	Plug	UG-88C/U
970	Coaxial Cable	RG-58()/U
971	Antenna	AT-805/ARN
972	Plug	UG-88C/U
973	Plug	14050
974	Dynamotor	DY-86/ARN-30
975	Power Unit	P-12
976	Light Assembly	MS25331-8
977	Light	MS25331-4
978	Relay	44B18574
979	Disconnect Splice	YZ18H1
980	Switch	50-344479
981	Inverter Change-Over	650-1740
982	Plug	MS3106-18-9P
983	Plug	MS3106-20-16P
984	Junction Box	50-344520-19
985	Emergency Relay Box Assembly	50-344617
986	Diode	IN158
987	Junction Box (Pilot's)	50-344537-1
988	Junction Box (Copilot's)	50-344537-1
989	Headset Adapter	MX1646()/AIC
990	Pilot Emergency Transmitter Switch	MS25103-3
991	Copilot's Emergency Transmitter Switch	MS25103-3
992	Receptacle	MS3102A-28-21B
993	Plug	MS3106A-28-21B
994	Receptacle	MS3102A-28-21P
995	Plug	MS3106A-28-21S
996	RH Subpanel Bus Bar	50-344491-1
997	Transmitter Circuit Breaker	D6761-1-40
998	Receiver Circuit Breaker	D6761-1-15
999	Relay	MS25030-3
1000	Switch	AN3022-1
1001	Mount	371001200
1002	Transceiver	180K-3
1003	Coaxial Cable	RG-8/U

Table 13-1. Equipment list (sheet 20 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1004	Plug	357900600
1005	Connector	RG-8/U
1006	Antenna Matching Network	50-340016-13
1007	Cable	314S-4
1008	Connector Plug	MS3106-28-21S
1009	Coaxial Cable	RG-8/U
1010	Antenna	50-340016-13
1011	Mount	
1012	Connector	MS3106-28-21S
1013	RH Subpanel Bus Bar	50-344446-5
1014	Pilot's Microphone Cord Assembly	50-344399-1
1015	Copilot's Microphone Cord Assembly	50-344399-1
1016	Plug	MS53106A-28-21P
1017	Receptacle	MS53106A-28-21S
1018	Relay	650-5147
1019	Junction Box Assembly	50-344362
1020	Lamp	MS25010
1021	Switch	12005-9
1022	Terminal Strip	
1023	ADF Receiver Circuit Breaker	D6761-1-5
1024	Plug	16742
1025	Power Unit	DY-150/ARN
1026	Plug	16115
1027	Control Unit	C-2275/ARN-59
1028	Plug	16115
1029	Receiver	R-836/ARN-59
1030	Cable Assembly	17985
1031	Sense Antenna	50-344481-25
1032	Cable Assembly	18637
1033	Loop Antenna	AT-780/ARN-59
1034	Plug	19062
1035	Plug	16210
1036	Indicator	ID-638/ARN
1037	Plug	14491
1038	Mount	MT-1912/ARN
1039	Mount	MT-1913/ARN
1040	Inverter Circuit Breaker	D7271-1-10
1041	Inverter On-Off Switch	AN3022-1
1042	Relay	MS24149D2
1043	AC Power Inverter (Main)	1-101A-115S-7
1044	Plug	MS3106B-14S-7S
1045	Inverter Adapter	MS3057-6B
1046	AC Power Inverter (Standby)	1-101A-115S-7
1047	Plug	MS3106B-14S-7S
1048	Inverter Adapter	MS3057-6B
1049	Relay	44B18574
1050	Light Assembly	MS25331-8
1051	Phase Adapter	661102B
1052	Junction Box	50-344664
1053	Hood Assembly Connector	2Z3046.86
1054	Pilot's Signal Distribution Panel	SB-329/AR
1055	Hood Assembly Connector	2Z3046.86
1056	Copilot's Signal Distribution Panel	SB329/AR

Table 13-1. Equipment list (sheet 21 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1057	Pilot's Wheel Switch Cord	43991
1058	Pilot's Microphone Wheel Switch	MS25089-3C
1059	Pilot's Microphone Foot Switch	MS25039-1
1060	Copilot's Wheel Switch Cord	43991
1061	Copilot's Microphone Wheel Switch	MS25089-3C
1062	Copilot's Microphone Foot Switch	MS25089-1
1063	Switch	MS35058-3
1064	Hood Assembly Connector	2Z3081-31
1065	Dynamotor	DY-107/AR
1066	Mount	MT1267/AR
1067	Relay	650-5147
1068	Pilot's Microphone Headset Adapter	MX1646/AIC
1069	Copilot's Microphone Headset Adapter	MX1646/AIC
1070	Terminal Strip	MS25123-1-6
1071	Microphone Cord	WF14/U
1072	Phone Jack	U-92(A)/U
1073	Terminal Strip	MS25123-1-16
1074	Microphone Cord	WF14/U
1075	Phone Jack	U-92(A)/U
1076	Transmitter	T-366()/ARC
1077	Rack	MT-1142()/ARC
1078	Relay	5524-HS
1079	Pilot Jack	3B
1080	Copilot's Jack	3B
1081	Omni 1 Circuit Breaker	D7271-1-5
1082	Plug	14321
1083	Converter Rack	MT-1175/ARN-30A
1084	Receiver Mount	MT-1174/ARN-30A
1085	Omni 1 Receiver	R-445/ARN-30
1086	Omni 1 Converter	CV-265/ARN-30A
1087	Dynamotor	DY-86()/ARN-30
1088	Plug	UG-274C/U
1089	Plug	UG-88C/U
1090	Coaxial Cable	RG-58C/U
1091	Plug	UG-88C/U
1092	Antenna	AS-580A/ARN-30
1093	Plug	14050
1094	Plug	14050
1095	Plug	15912
1096	Navigation Control	C-1254/ARN-30
1097	Plug	14320
1098	Omni 1 Indicator	ID-453/ARN-30
1099	Omni 2 Circuit Breaker	D7271-1-5
1100	Plug	14491
1101	Converter Rack	E-17
1102	Receiver Mount	MT-1174()/ARN-30A
1103	Omni 2 Converter	CV-265/ARN-30A
1104	Omni 2 Receiver	R-445/ARN-30
1105	Dynamotor	DY-86()/ARN-30A
1106	Plug	UG913()/U
1107	Coaxial Cable	RG-58C/U
1108	Plug	UG-913()/U
1109	Plug	15912

Table 13-1. Equipment list (sheet 22 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1110	Plug	14050
1111	Plug	14050
1112	Navigation Control	C-1254A/ARN-30
1113	Plug	14320
1114	Indicator	ID-453/ARN-30
1115	Three-Phase Power Circuit Breaker	D7271-1-3
1116	Gyro Amplifier Circuit Breaker	D7271-1-3
1117	Attitude Indicator On-Off Switch	MS35059-9
1118	Plug	MS3106B-10SL-3S
1119	Adapter	MS3057-4B
1120	Attitude Indicator	Type J-8
1121	Plug	MS3106R20-11S
1122	Adapter	MS3057-12B
1123	Gyrosyn Amplifier	653895
1124	Compass Cutout Switch	MS35059-3
1125	Plug	721966
1126	Gyrosyn Indicator	653894-2B(C-2A)
1127	Junction Box	661847
1128	Flux Valve	656520
1129	Compensator Flux Valve	656767
1130	AN/ARC-55 Radio Circuit Breaker	D7271-1-25
1131	Plug	MS3108B-24-7S
1132	Adapter	MS3057-16B
1133	Adapter	MS3057-16B
1134	Plug	MS3108B-24-5S
1135	Transceiver	RT-349/ARC-55
1136	Transceiver Mount	MT-1536/ARC-55
1137	Connector	UG-536B/U
1138	Coaxial Cable	RG-58C/U
1139	Plug	UG-88C/U
1140	Antenna	AT-450/ARC-45
1141	Plug	KC3-21-30-SN
1142	End Bell	K06-21-5/8
1143	Control Panel	C-1827/ARC-55
1144	Glide Slope Circuit Breaker	D7271-1-5
1145	Receiver	R746()/AR
1146	Receiver Mount	MR-92A
1147	Connector	UG-536C/U
1148	Coaxial Cable	RG-58C/U
1149	Plug	UG-88C/U
1150	Receptacle	DA15P
1151	Plug	DA15S
1152	Glide Slope Control Panel	C2065/AR
1153	ADF Circuit Breaker	D7271-1-5
1154	Plug	16742
1155	Power Unit Mount	MT-1913/ARN
1156	Dynamotor	DY-150/ARN
1157	Plug	19062
1158	Loop Antenna	AT-780/ARN-59
1159	Cable Assembly	17985
1160	Plug	16115
1161	Receiver	R836/ARN-59
1162	Receiver Mount	MT-1912/ARN

Table 13-1. Equipment list (sheet 23 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1163	Right Angle Adapter	UG-306()/U
1164	Coaxial Cable	18637
1165	Right Angle Adapter	UG-306()/U
1166	Feed Through Insulator	19077
1167	ADF Sense Antenna	50-344658
1168	Plug	16115
1169	ADF Control	C2275/ARN
1170	Plug	14491
1171	ADF Indicator	ID-637/ARN
1172	Marker Receiver Circuit Breaker	D7271-1-5
1173	Marker Audio Variable Resistor	8487
1174	Marker Beacon Light	MS25041-3
1175	Connector	MM5-11-5/6
1176	Marker Beacon Receiver	R-666()/ARN-32
1177	Receiver Mount	MT-1456()/ARN-32
1178	Connector	UG-88C/U
1179	Coaxial Cable	RG-58C/U
1180	Adapter	UG-636()/U
1181	Connector	UG-88C/U
1182	Antenna	AT-640A/ARN
1183	Transmitter Circuit Breaker	D7271-1-5
1184	Switch	12004-7
1185	Plug	14050
1186	Dynamotor	DY-86/ARN-30
1187	Power Unit	P-12
1188	Plug	16115
1189	Oscillator Relay	O-423/AR
1190	Mount	MT-1677/AR
1191	Plug	UG-88C/U
1192	Coaxial Cable	RG-58C/U
1193	Plug	UG-88C/U
1194	Antenna	AT-805/ARN
1195	Plug	UG-88C/U
1196	Coaxial Cable	RG-58C/U
1197	Plug	UG-88C/U
1198	Transmitter	T-366()/ARC
1199	Rack	MT-1142()/ARC
1200	Plug	14050
1201	Plug	14052
1202	Plug	14051
1203	Diode	IN158
1204	Diode	IN158
1205	Resistor	1000 ohm, 5%, 1 watt
1206	Capacitor	1250 MFD, 3 VDC
1207	Resistor	220 ohm, 5-10%, 1 watt
1208	Resistor	120 ohm, 5-10%, 1/2 watt
1209	Resistor	120 ohm, 5-10%, 1/2 watt
1210	Resistor	220 ohm, 5-10%, 1 watt
1211	Resistor	150 ohm, 5-10%, 1/2 watt
1212	Resistor	1000 ohm, 5-10%, 1/2 watt
1213	Resistor	27 ohm, 5-10%, 1/2 watt
1214	Resistor	220 ohm, 5-10%, 1 watt
1215	Resistor	120 ohm, 5-10%, 1/2 watt

Table 13-1. Equipment list (sheet 24 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1216	Resistor	1200 ohm, 5-10%, 1/2 watt
1217	Resistor	1800 ohm, 5-10%, 1 watt
1218	Capacitor	0.47 MFD, 200 VDC
1219	Resistor	6800 ohm, 5-10%, 1 watt
1220	Resistor	6800 ohm, 5-10%, 1 watt
1221	Resistor	680 ohm, 5-10%, 1 watt
1222	Receptacle	MS3102-20-29P
1223	Receptacle	MS3102-20-29S
1224	Power Relay	MS24149D2
1225	Receptacle	DPA-24HV2-33S2
1226	Transmitter	17L-7A
1227	Line Jack	UG-89()/U
1228	Plug	UG-88/U
1229	Receptacle	DPA-24C2-33S-2
1230	Receptacle	DPA-24C1-33S-2
1231	Receiver	51X-2B
1232	Plug	DD-50S-C7
1233	Control Unit	614U-6
1234	Plug	DD-50S-C7
1235	Control Unit	614U-6
1236	Circuit Breaker	D7271-1-10
1237	Plug	PT06A(SR)-18-32S
1238	Control	C2714()APX-44
1239	Mount	MT-2100()/APX-44
1240	Transponder	RT-494()/APX-44
1241	Plug	UG-709A/U
1242	Plug	UG-709A/U
1243	Antenna	AT-884()/APX-44
1244	Relay	MS24149D2
1245	ADF Circuit Breaker	D7271-1-15
1246	Plug	16742
1247	Dynamotor	DY-150/ARN
1248	Plug	16115
1249	Receiver	R-836()/ARN-59
1250	Cable Assembly	18637
1251	Sense Antenna	50-344742
1252	Cable Assembly	17985
1253	Plug	19062
1254	Loop Assembly	AT-708()/ARN-59
1255	Receiver Circuit Breaker	D6761-1-15
1256	Relay	MS25030-3
1257	Plug	16115
1258	Control Unit	C2275()/ARN
1259	Pilot's Microphone	M32()/AIC
1260	Copilot's Microphone	M32()/AIC
1261	Resistor	6800 ohm, 10%, 1/2 watt
1262	Resistor	6800 ohm, 10%, 1/2 watt
1263	Capacitor	0.25MF, DYR6025
1264	Capacitor	0.25 MF, DYR6025
1265	Resistor	680 ohm, 1 watt, 10%
1266	Resistor	6800 ohm, 1 watt, 10%
1267	Plug	14491
1268	Resistor	150 $\pm$ 5 or 10%, 1/2 watt

Table 13-1. Equipment list (sheet 25 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1269	Mount	350D-3
1270	Plug	5D-34766001
1271	Main Communications Circuit Breaker	D7271-1-15
1272	Mount	MT-2019/ARN
1273	Mount	MT-2018/ARN
1274	Bus Bar	
1275	Transmitter	17L-7A
1276	Shockmount	390E-2
1277	Receptacle	DPA-24-C2-33S-2
1278	Receptacle	DPA-24-C2-33S-2
1279	Receptacle	DPA-24HV2-33S-2
1280	Receiver	51X-2B
1281	Connector	DD-50-S-C7
1282	Connector	DD-50-S-C7
1283	Transmitter Receiver Control	614U-6
1284	Receiver Control	614U-6
1285	Receptacle	MS3101A-28-21P
1286	Plug	MS3106A/B-28-21S
1287	Switch	12006-8
1288	Relay	MS25024-2
1289	Transmitter Circuit Breaker	D6761-1-10
1290	Receiver Circuit Breaker	D6761-1-5
1291	Light Assembly	MS25010-3A
1292	Antenna	37R-2
1293	Control Unit	C2714()/APX-44
1294	Receptacle	PT06A(SR)-18-32S
1295	VHF Relay	MS24149D2
1296	UHF-VHF Relay	MS24149D2
1297	FM Relay	MS24149D2
1298	Relay	MS24149D2
1299	Transponder Circuit Breaker	D6761-1-10
1300	Transponder	RT-494/APX-44
1301	Transponder Mount	MT2100()/APX-44
1302	Antenna	AT-884()/APX-44
1303	Resistor	6800 ohm, 1/2 watt
1304	Resistor	6800 ohm, 1/2 watt
1305	Capacitor	DYR6025
1306	Capacitor	DYR6025
1307	RH Subpanel Bus Bar	50-344446-5
1308	ADF Circuit Breaker	D6761-1-5
1309	Plug	ARC16742
1310	Power Unit	DY-150/ARN
1311	Plug	ARC16115
1312	ADF Receiver	R-836/ARN-59
1313	Jack	J-101
1314	Jack	J-102
1315	Antenna Cable Assembly	ARC18637
1316	Sense Antenna	50-344481-25
1317	Loop Antenna Cable Assembly	ARC17985
1318	Plug	ARC16743
1319	Indicator	ID-718/ARN
1320	Plug	ARC12096
1321	Plug	ARC14320

Table 13-1. Equipment list (sheet 26 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1322	Plug	ARC19062
1323	Plug	ARC19062
1324	Loop Antenna	AT-780/ARN-59
1325	Plug	J-402
1326	Control Unit	C-2275/ARN
1327	Plug	ARC16115
1328	Indicator	ID-718/ARN
1329	Plug	ARC18713
1330	Relay	44B18574
1331	Gyrosyn Indicator	ID-567/ASN
1332	Terminal Strip	MS25123-1-11
1333	Connector	739828
1334	Servo Amplifier	1783867-1
1335	Connector	1406-55-SO
1336	Hood	1406-H90
1337	C-6H RMI Indicator	1783755-615
1338	Plug	DPD-32-33S-IL
1339	Receiver	R-746()/AR
1340	Mount	MT1762()/AR
1341	Connector	MS3106A-22-14S
1342	Copilot's Indicator	ID-250
1343	Junction Box	50-344929
1344	Hood Assembly Connector	FSN-5935-642-5387
1345	Copilot's Signal Distribution Panel	SB-329()/AR
1346	Hood Assembly Connector	FSN-5935-642-5387
1347	Pilot's Signal Distribution Panel	SB-329()/AR
1348	Pilot's Microphone Wheel Switch	C100Y4-1
1349	Co-Pilot's Microphone Wheel Switch	C100Y4-1
1350	Hood Assembly Connector	FSN-5935-201-7935
1351	Dynamotor	DY-107()/AR
1352	Mount	MT1267()/AR
1353	Relay	645-6107
1354	Cable Assembly	50-344670-11
1355	Phone Jack	U-92A/U
1356	Cable Assembly	50-344670-11
1357	Phone Jack	U-92A/U
1358	Relay	5424-23HS
1359	Switch	MS35059-2
1360	Switch	MS35059-2
1361	Plug	14050
1362	Connector	14052
1363	Connector	14051
1364	Ampspeaker	MI-51B
1365	Connector	MS-3106-14S-6P
1366	Transformer	A8101
1367	Switch	MS35059-1
1368	Audio Circuit Breaker	D7271-1-5
1369	Transformer	9T39Y4
1370	Hood Assembly Connector	FSN-5935-643-6904
1371	FM Transceiver	RT-294/ARC-44
1372	Mount	MT-1268/AR
1373	Hood Assembly Connector	FSN-5935-642-5387
1374	FM Control	SB-327()/ARC-44

Table 13-1. Equipment list (sheet 27 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1375	Omni No. 1 Receiver	R1021()/ARN-30D
1376	Dynaverter	PP2792()/ARN-30D
1377	Plug	UG-913A/U
1378	Plug	16115
1379	Plug	16115
1380	Connector	21984
1381	RMIB-18A Converter	B18A
1382	RMI Converter Mount	M41B
1383	Coaxial Cable	RG-58C/U
1384	Navigation Control	C-3436()/ARN-30D
1385	Plug	14321
1386	Omni No. 2 Receiver	R1021()/ARN-30D
1387	Converter Rack	MT-1175/ARN-30A
1388	Dynaverter	PP-2792()/ARN-30D
1389	Plug	16115
1390	Plug	UG-913A/U
1391	Plug	14050
1392	Plug	16115
1393	Navigation Control	C-3436()/ARN-30D
1394	Connector	21984
1395	RMIB-18S Converter	B18A
1396	RMI Converter Mount	M41B
1397	Coaxial Cable	RG-58C/U
1398	Plug	UG-88C/U
1399	Switch	MS35058-3
1400	Plug	UG-88C/U
1401	Plug	UG-88C/U
1402	Plug	UG-274B/U
1403	Junction Shell	DA
1404	Junction Shell	DA
1405	Lock Assembly	DA-LMM
1406	Lock Assembly	DA-LMM
1407	Lock Assembly	DA-LMF
1408	Lock Assembly	DA-LMF
1409	Light Assembly	MS25010-3A
1410	Light Assembly	MS25010-3A
1411	Power Unit Mount	MT2019()/ARN
1412	Power Unit	P14
1413	Loop Antenna	AT-780()/ARN-59
1414	Receiver Mount	MT2018()/ARN
1415	Plug	16115
1416	ADF Control	C2275()/ARN-59
1417	Plug	16115
1418	Marker Audio Variable Resistor	CU1511
1419	Connector	MRE-98-G/YL
1420	Marker Beacon Receiver	R-737()/ARN-68
1421	Receiver Mount	MT-2292/ARN-68
1422	Connector	IPC-4500
1423	Plug	UG-88C/U
1424	Marker Receiver Switch	CS-1
1425	Switch	MS35058-3
1426	Coaxial Cable	RG-58C/U
1427	Plug	14050

Table 13-1. Equipment list (sheet 28 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1428	Plug	UG-88C/U
1429	Plug	14321
1430	Coaxial Relay	K18
1431	Resistor	220 ohm, 10%, 1 watt
1432	Resistor	120 ohm, 10%, 1/2 watt
1433	Resistor	120 ohm, 10%, 1/2 watt
1434	Resistor	220 ohm, 10%, 1 watt
1435	Resistor	220 ohm, 10%, 1 watt
1436	Resistor	120 ohm, 10%, 1/2 watt
1437	Resistor	1800 ohm, 10%, 1 watt
1438	Resistor	6800 ohm, 10%, 1 watt
1439	Resistor	6800 ohm, 10%, 1 watt
1440	Resistor	680 ohm, 10%, 1 watt
1441	Resistor	75 ohm, 10 watt wire wound
1442	Dust Cap	CA2209-7
1443	Dust Cap	CA2209-7
1444	Circuit Breaker	D7271-1-10
1445	ARC-44 Squelch Switch	MS35058-3
1446	Connector	FSN-5935-643-6904
1447	Transceiver	RT-294/ARC-44
1448	Transceiver Mount	MT-1268()/AR
1449	Connector	FSN-5935-642-5387
1450	FM Control	SB-327()/AR
1451	Plug	UG-88C/U
1452	Coaxial Cable	RG-58C/U
1453	Connector	UG-89C/U
1454	ARR-46 Receiver	R712()/ARR-46
1455	Receiver Mount	MT-1658/AR
1456	Plug	UG-88C/U
1457	Coaxial Cable	RG-58C/U
1458	Plug	UG-88C/U
1459	Antenna	AT-454/ARC
1460	Connector	57-20140
1461	ARR-46 Squelch Switch	MS35058-3
1462	Dust Cap	CA2209-7
1463	Relay	MS24149D2
1464	Antenna	37R-2
1465	Switch	12004-7
1466	Plug	MS3108B-24-7S
1467	Circuit Breaker	D7271-1-25
1468	Audio Circuit Breaker	D6761-5
1469	Switch	MS35059-3
1470	Antenna	37R-2U
1471	Relay	MS24166D1
1472	Inverter	PU-544
1473	Plug	MS3106-24-20S
1474	Adapter	MS3057-16B
1475	Relay	MS24166D1
1476	Inverter	MS21983-1
1477	Plug	MS3106-24-20S
1478	Adapter	MS3057-16B
1479	Navigation Control	C346A/ARN-30D
1480	Navigation Control	C346A/ARN-30D

Table 13-1. Equipment list (sheet 29 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1481	Plug	16210
1482	Coaxial Cable	RG-58/U
1483	Plug	357-9686-00
1484	Plug	D7271-1-25
1485	Indicator	ID-718/ARN
1486	Plug	ARC16743
1487	Radar Indicator	IP-724/APN-158
1488	Control	C-4881/APN-158
1489	Antenna	AS1520/APN-158
1490	Panel Assembly	556-9916
1491	Transformer	MS90004
1492	Stabilization Switch	762-1143-101
1493	Terminal Board	MS25123-1-9
1494	Resistor	10000 ohm
1495	Resistor	18000 ohm
1496	Resistor	1000 ohm
1497	Capacitor	0.56 MFD
1498	R-T Unit	RT-711/APN-158
1499	Mount	MT-3068/APN-158
1500	Synchronizer	SN-358/APN-158
1501	Mount	MT-3069/APN-158
1502	Waveguide	L644-36
1503	Connector	PT06A-18-32S(SR)
1504	Connector	DA-15S
1505	Connector	PT06A-14-19S(SR)
1506	Connector	PT01A-14-19P(SR)
1507	Connector	DPX-32C2-33S
1508	Connector	DPX2-M16C3S
1509	Auxiliary Circuit Breaker Panel Lights	
1510	Auxiliary Circuit Breaker Panel Bus Bar	
1511	AN/ARC-102 CPLR Circuit Breaker	MS25244-5
1512	AN/ARC-102 R-T Circuit Breaker	MS25244-50
1513	Receiver-Transmitter	RT-698()/ARC-102
1514	Power Inverter Mount	PP-3702()/ARC-102
1515	Control	C-3940()/ARC-94
1516	Antenna Coupler	CU-991()/AR
1517	Relay Assembly	1560-U8-293
1518	HF-UHF/VHF Transmitter Selector Switch	MS35058-22
1519	Mount	MT-1719/AR
1520	Filter	757-3000-001
1521	Terminal Strip	MS27212-4-6
1522	Terminal Strip	MS27212-2-8
1523	HF Antenna Assembly	1560-U8-274-1
1524	Insulator Assembly	MS25054-1B
1525	Connector	DPE-60-33S
1526	Connector	UG-21/U
1527	Connector	PL259-A
1528	Plug	SK-C16-23C1-2
1529	Plug	PT06A-20-39S(SR)
1530	Plug	MS3116E-14-19S
1531	Transformer	MS90003-1
1532	Relay	MS24139-6
1533	Relay	MS25273D1

Table 13-1. Equipment list (sheet 30 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1534	Diode	1N540/JAN
1535	Plug	MS3106A/B-28-21S
1536	Receptacle	MS3101A/B-28-21P
1537	Plug	PL259-A
1538	Coaxial Cable	TG-8/U
1539	Plug	PL259-A
1540	Relay	MS25024-2
1541	Wire Assembly	50-034093-1
1542	RH Subpanel Bus Bar	50-344446-1
1543	HF Fil Circuit Breaker	D6761-1-5
1544	HF Rcvr Circuit Breaker	D6761-1-15
1545	HF Transmitter Circuit Breaker	D6761-1-35
1546	UHF On-Off Switch	MS35059-1
1547	Relay	MS24168-1
1548	Connector	NK-27/21C-11/16-2
1549	Control	314S-6
1550	Harness Assembly	50-034093-1
1551	Mount	350C-5
1552	Transceiver	18S-4A
1553	Plug	PL259-A
1554	Cable Assembly	50-034093-17
1555	Plug	PL259-A
1556	Antenna Matching Network	180K-3
1557	Plug	503-4766001
1558	Cable Assembly	50-034093-19
1559	Terminal	MS25036-15
1560	Antenna Installation	50-034089-1
1561	Connector	MS3106A/B-28-21P
1562	Plug	MS3106A/B-28-21S
1563	Mike Jack	JJ-033
1564	Phone Jack	JJ-034
1565	UHF Power Circuit Breaker	D6761-20-35
1566	Resistor	10000 ohm, 1 watt, 5%
1567	Capacitor	1250 MFD, 3V DC
1568	Connector	
1569	Mount	
1570	Relay	5424-HS-23
1571	Plug	MS3106-22-6S
1572	Plug	MS3106-22-5P
1573	Circuit Breaker	MS25244-50
1574	Junction Box, Radio	50-344520-19
1575	Switch	MS35058-22
1576	Connector, Coaxial	UG709-A/U
1577	Connector	MRE-9S-G/VL
1578	Connector, Coaxial	UG699/U
1579	Switch - VOL Control	CS-1 MS35058-3
1580	Antenna	AT-640A/ARN
1581	Marker Beacon Receiver	R-1041()/ARN12
1582	Marker Light	MS25041-3
1583	Marker Receiver Circuit Breaker	D7271-1-5
1584	Rheostat	0318-351
1585	Circuit Breaker	MS25244-5
1586	Connector	DCMA37S

Table 13-1. Equipment list (sheet 31 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1587	Connector	PT06SE20-41SX(SR)
1588	Capacitor	TGS50-.05MF
1589	Terminal Board	MS27212-1-10
1590	Jack	B-3
1591	Keying Relay	MS27255-2
1592	Mic Jack	U92AU
1593	Foot Switch	MS25039-1
1594	Switch	MS25089-?
1595	Junction Box	50-34452-19
1596	Control Set Intercommunication	C-1611D/AIC
1597	Junction Box, Interphone	4452-1-4222
1598	Connector	PT0GSE20-41S(SR)
1599	Connector	MS24266R22B55S
1600	Control Panel, IFF	C6280/APX
1601	Audio Transformer	31-11382-1
1602	Connector	MRE9SGVL
1603	Connector	ARC16115
1604	Receiver-Transmitter	AN/APX-72
1605	Receiver, ADF	R836/ARN-59
1606	Connector	DPJ59C10-34SB
1607	Connector	DPE60-33S
1608	Receiver-Transmitter	RT698()/ARC-102
1609	Control	C-3940/ARC-94
1610	Connector	MS3126E20P5
1611	Connector	PT06SE16-26SW(SR)
1612	Connector	PT06SE20-39SSP
1613	Control Unit	C-6287/ARC51BX
1614	Connector	MS3126F18-32S
1615	Receiver-Transmitter	RT-742/ARC-51BX
1616	Connector	MS3126F16-26S
1617	Control	C-7197/ARC-134
1618	Connector	DD50S
1619	Connector	DPA-24HV2-33S
1620	Connector	DPA-24C2-33S
1621	Connector	PT06SE20-39SY(SR)
1622	Control, Radio Set	C-3835/ARC-54
1623	Connector	PT06SE24-61SSR
1624	Connector	DPX2F40C1SF40C1S33B0003
1625	Connector	DPA-29C1-33S
1626	Transceiver	RT-857/ARC-134
1627	Connector	ARC4052
1628	Side Tone Relay	MS25123-2-6
1629	Control	C-3436A/ARN30D
1630	Connector	ARC14050
1631	Connector	UG 913/U
1632	Connector	ARC14321
1633	Connector	PT06SE20-39S(SR)
1634	Circuit Breaker	MS25017-5
1635	Connector	MS3126F16-26SW
1636	Connector	MS3126F16-26S
1637	Indicator	ID-1003/ARC-51BX
1638	Connector	UG536A/U
1639	Connector	8000-1

Table 13-1. Equipment list (sheet 32 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1640	Antenna, UHF	AT-1108
1641	Cooler, Air	HD-615/ARC-51 BX
1642	Filter, Line	A354
1643	Circuit Breaker	MS24509-15
1644	Inverter	PU543/A
1645	Connector	MS3108R24-20S
1646	Relay	AN3311-2
1647	Relay	AN3350-2
1648	Phase Adapter	IPA1000
1649	Circuit Breaker	D6761-1-15
1650	Circuit Breaker	D6761-1-25
1651	Circuit Breaker	D6761-1-5
1652	Circuit Breaker	D6761-1-3
1653	Circuit Breaker	D6761-1-1/2
1654	Circuit Breaker	D6761-1-10
1655	Circuit Breaker	MS25361-60
1656	Circuit Breaker	MS39064-2
1657	Connector	MS3106R22-5P
1658	Connector	MS3106R22-6S
1659	Filter	A4818
1660	Filter	A373
1661	Relay	MS25395A1
1662	Inverter	PU544-A
1663	Inverter Failure Light	MS25331-4-313
1664	Relay	MS24143D1
1665	Connector	SK-C16-23C1/2
1666	Connector	PL259-A
1667	Circuit Breaker	MS25244-5
1668	Circuit Breaker	MS25244-50
1669	Coupler, Antenna	CU-991()/AR
1670	Connector	19062
1671	Cable Assembly	17995
1672	Connector	16115
1673	Control Unit	C-2275/ARN
1674	Power Unit	DY-150/ARN
1675	Connector	16742
1676	Connector	16115
1677	Cable Assembly	18637
1678	Receiver	R-836/ARN
1679	Connector	1406-55SQ
1680	Hood	1406H90
1681	RMI Indicator	ID-998/ASN
1682	Connector	721966
1683	Junction Box	661847
1684	Connector	MS3106R20-11S
1685	Compass Cutout SW.	AN3023-2
1686	Switch	MS35059-23
1687	Remote Compass Transmitter, T-611	656520
1688	Control Amplifier	AM1514/ASN
1689	Indicator, Compass	ID-587/ASN
1690	Connector	739828
1691	Amplifier, Servo	AM3209/ASN
1692	Connector	PT06SE24-61SSR

Table 13-1. Equipment list (sheet 33 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1693	Control, Radio Set	C-3835/ARC-54
1694	Connector	MS3124E-12-10P
1695	Connector	MS3124E-16-26PW
1696	Connector	PT06SE12-10SSR
1697	Coupler	CU-942/ARC-54
1698	Receiver-Transmitter	RT-348/ARC-54
1699	Filter	A-354
1700	Connector	UG88E/U
1701	Connector	DM53742-5004
1702	Connector	DD50S-C7
1703	Junction Shell	DD24661
1704	Filter	A-605
1705	Connector	PT02SE20-41P
1706	Switch	MS35059-23
1707	Connector	PT02SE20-39P,
1708	Relay	MS25267-D1
1709	Connector	PT02SE20-41PX
1710	Connector	PT02SE16-26PW
1711	Connector	MS3126F-16-26SW
1712	Connector	MS3126F-12-10S
1713	Control, KY28	C8157/ARC
1714	Connector	UG1213/U
1715	Connector	MS3106R18-1P
1716	Connector	MS3106R20-27P
1717	Connector	KM6-21-30SNMK2
1718	Connector	MS3106R18-98
1719	Connector	MS3106R22-14S
1720	Blower	2H414YS
1721	Control Unit	C-2010/ARN-52V
1722	Indicator, Bearing - Direction - Heading	ID663/U
1723	Transformer, Audio	31-11382-1
1724	Connector	MS3106R24-28P
1725	Receiver-Transmitter	RT-384/ARN-52V
1726	Switch	MS35058-23
1727	Relay	MHD6D26-5VDC
1728	Connector	UG1213/U
1729	Connector Adapter	UG212C/U
1730	Connector	P/O AT-741A
1731	Antenna	AT-471A
1732	Indicator, Course	ID387/ARN
1733	Connector	MS3106R28-12S
1734	Control, Transponder	C-2714()APX-44
1735	Connector	PT06SE18-32SSR
1736	Connector	MS24264R22B55P
1737	Connector	MS24266R22B55S
1738	Light, Caution, IFF	MS25041-4
1739	Circuit Breaker	D6761-1-5
1740	Circuit Breaker	D6761-1-10
1741	Connector	DPJ59C10-34SB
1742	Connector	UG1033/U
1743	Connector	DPJ59C10-33PB
1744	Connector	UG1185/U
1745	Connector	UG1033/U

Table 13-1. Equipment list (sheet 34 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1746	Connector	MS24266R12-B12S
1747	Test Set, Transponder	TS-1843()APX
1748	Adapter	UG565A/U
1749	Receiver-Transmitter	RT-404()/APX-44
1750	Hood	DPD33-11612
1751	Connector	DPD45-33S1L
1752	Antenna	AT-884
1753	Connector	UG573B/U
1754	Hood	G71-2A
1755	Connector	UG 1185/U
1756	Converter, RMI	CV-1275()/ARN
1757	Connector Kit	22366
1758	Receiver, Glideslope	R-746()/AR
1759	Control	C-3436-A/ARN-30D
1760	Receiver	R-1021/ARN-30D
1761	Indicator	ID453/ARN-30
1762	Connector	14320
1763	Connector	15912
1764	Connector	14050
1765	Connector	16115
1766	Connector	16210
1767	Connector	14321
1768	Transformer	31-11382-1
1769	Plug	DPD-32-33S-IL
1770	Antenna	AT-780/ARN-59
1771	Connector	19062
1772	Transformer	27E22
1773	Connector	PT06SE18-32SSR
1774	Connector	MS24266R22B55S
1775	Connector	MS24264R22B55P
1776	Light, IFF Caution	MS25041-4
1777	Connector	DPJ59C10-34SB
1778	Hood	G71-2A
1779	Connector	DPJ59C10-33PB
1780	Hood	G71-1B
1781	Connector	DPD45-33SIL
1782	Hood	DPD33-11612
1783	Connector	MS24266R12B12S
1784	Circuit Breaker	D7271-1-15
1785	Connector	UG-21/U
1786	Connector	DPE-60-33S-A101
1787	Insulator	MS25054-1B
1788	Connector	SK-C16-23C-1/2
1789	Connector	MS3116E20-39S
1790	Connector	DEM9P
1891	Connector	DEMF-9S
1792	Chip Detector	2810U8-041-5
1793	Indicator Light (W/Lamp)	MS25041-8-327
1794	Circuit Breaker	D7271-1-5
1795	Light	B2180
1796	Switch	8480K1
1797	Step Warning Light	50-364226
1798	Connector	DEM9S

Table 13-1. Equipment list (sheet 35 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1799	Limit Switch	AN3170-1
1800	RH Air Filter Actuator	CYLC 9318
1801	LH Air Filter Actuator	CYLC 9318
1802	RH Actuator Relay	50-380048-1
1803	LH Actuator Relay	50-380048-1
1804	ARN-58	R844
1805	Radio Junction Box	
1806	Marker Beacon Light	
1807	ARN-30-D Control Unit	C3435A
1808	ARN Indicator #1	10453
1809	ARN Indicator #2	10453
1810	Marker Beacon Audio Switch	
1811	Marker Beacon Limiter	
1812	ARC-54	RT348-MT1535
1813	KY-28	
1814	Audio Transformer #1	31-11282
1815	Audio Transformer #2	31-11282
1816	ARC KY-28 Control	C8157
1817	Auxiliary Power Box	4452-3-4922
1818	Remote Cipher Indicator Light	
1819	Marker Hi Lo Sensitivity Switch	
1820	Receiver Transmitter	AN/APX72
1821	Transponder Control	APX44
1822	Transponder Test Set	TS-1843
1823	APX-44	RT-494
1824	Bulkhead Connector for AN/APX44	
1825	Diode	IN645
1826	FM & ARD/15 Antenna Ground Relay	50-380048-1
1827	490 T-1A Antenna Coupler	
1828	ARC 102 Circuit Breaker HF Control	
1829	Receiver Transmitter Circuit Breaker	
1830	Diodes	IN2070
1831	ARC-102 Rcvr-Xmtr	RT698
1832	Power Supply	
1833	Terminal Board 1	
1834	ARC94 Control	C3940
1835	DC Filter	
1836	Knife Splice	
1837	Ug 107B/U Tee	
1838	Coax Switch	19100
1839	Th75 180-T	
1840	DF Control Box	
1841	ARD-15 Circuit Breaker	
1842	Transformer	MS9001
1843	Phone Jack	JJ134
1844	Interphone Switch	
1845	Control Box	X3938-2-4206
1846	DF System Control Panel Circuit Breaker	
1847	APN168 Antenna	AS1766
1848	APN168 Radar Transceiver	OA7401
1849	APN168 Frequency Tracker	OA7400
1850	ASN64 Junction Box	1767-1-4505
1851	Doppler Input-Output	J104

Table 13-1. Equipment list (sheet 36 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1852	Doppler Computer Interconnection	J103
1853	Doppler Ramp Checker	J102
1854	AYA3 Computer	0A7432
1855	AYA3 Indicator	C6586
1856	AYA3 Velocity Steering Indicator	ID1282
1857	R.H. Flight Instrument PNL Strip	
1858	Power Distribution Box	1767-1-4654
1859	Transmitter	T992/A
1860	Controller R-746/AR ILS Radio Receiver	C-2065/AR
1861	Driftmeter Gyro	
1862	Driftmeter	AN5763-18
1863	Forward Baggage Compartment Relays	
1864	Instrument Panel Fuse Panel	
1865	Attitude Indicator Relay	
1866	Inverter Relays	
1867	Terminal Board	
1868	Main Instrument Panel	
1869	L.H. Equipment Light	
1870	Center Equipment Light	
1871	Magnetic Compass	
1872	Compass Excitation Circuit Breaker	
1873	ADF #1 Loop Antenna	
1874	Course Indicator	ID-250/ARN
1875	Compass Junction Box	3938-1-4257
1876	Inverter Control Circuit Breaker	
1877	Digital Controller	
1878	Flux Valve	
1879	Remote Compensator	
1880	Amplifier Power Supply	
1881	Directional Gyro Scope	
1882	RMI Converter	CV1275/ARN
1883	ARC-51BX	RT-742
1884	Control Unit	C-6287
1885	VSWR Indicator	ID-1003
1886	Air Cooler	HD-615
1887	Transformer	
1888	Radio Control Set	C-3335
1889	ARC-54 Antenna Coupler	CU-942
1890	ARC-54 FM	
1891	ARN-59 ADF Receiver	R836
1892	ARN-30 Receiver Converter	
1893	Indicator	ID453
1894	Control	C-3436A
1895	Vertical Gyro	MD-1
1896	Overhead Terminal Board	
1897	Phase Adapter	IPA1000
1898	ARN-30D Omni Receiver	R1021
1899	ARD-15 Control Panel	3938-2-4206-1
1900	Emergency VHF mtr	T-366
1901	Sidetone Relay	5424-HS-23
1902	ARN-32 Marker Beacon Receiver	
1903	Marker Beacon Audio	
1904	Control	C-3835

Table 13-1. Equipment list (sheet 37 of 37)

ITEM NO.	NOMENCLATURE	PART NO. OR SPEC
1905	Control	C-3940
1906	Control	C-4074
1907	ARC-73 Receiver	
1908	ARC-73 Transmitter	
1909	Pilots Keying Relay	MS27255-2
1910	Copilots Keying Relay	MS27255-2
1911	IFF Control	C6280PAPX
1912	Intercommunications Control Pilots	C-1611
1913	Intercommunications Control Copilots	C-1611
1914	Interphone C. B. Copilots	
1915	Interphone C. B. Pilots	
1916	FM Disable Switch	MS35059-23
1917	Radio Operators Intercommunications Control	C-1611
1918	Keying Relay, Radio Operators	MS27255-2
1919	Mic Jack, Radio Operators	U94AU
1920	ARC 94	C3940
1921	DF Receiver	
1922	Comm. Receiver	
1923	Filter Case Assembly	
1924	Interphone C.B. Radio Operators	
1925	Co-pilots Foot Switch	
1926	Co-pilots Yoke Mix Switch	MS25039-1
1927	Pilots Foot Switch	
1928	Pilots Yoke Mic Switch	MS25039-1

Table 13-1A. Equipment list, supplemental (Sheet 1 of 6)

Item No.	Nomenclature	Part No. or Spec.
1929	Switch	MS35059-23
1930	Junction Box, Radio	1560-U8-988-1
1931	Converter	CV-1275()/ARN
1932	Connector	22366
1933	Transformer	27F22
1934	Transformer, Audio	31-11382-1
1935	Junction Box, Inph	1560-U8-1009-1
1936	Connector	PT06SE20-41S (SR)
1937	Connector	PT06SE20-41SX (SR)
1938	Connector	PT06SE20-39S (SR)
1939	Connector	PT06SE16-26SW (SR)
1940	Coupler, Antenna	CU-1658A
1941	Adapter, Connector	357-9693-00
1942	Connector, Plug	SK-C16-23C1-2
1943	Connector	PL259-A
1944	Control Set, Intercommunication	C-1611()/AIC
1945	Connector	DCMA37S
1946	Capacitor	TGS50-0.052 MF
1947	Jack, Microphone	U92A/U
1948	Circuit Breaker	MS25017-5

Table 13-1A. Equipment list, supplemental (Sheet 2 of 6)

Item No.	Nomenclature	Part No. or Spec.
1949	Filter	A205
1950	Relay	MS27255-2
1951	Transformer, Audio	A8101
1952	Connector	MS3106-14S-6P
1953	Speaker Amplifier	M1-51B
1954	Control Panel, IFF	C-6280/APX
1955	Connector	MS24266R22B55S
1956	Receiver	R-1041/ARN
1957	Connector	MRE9 SGVL
1958	Receiver	R-856/ARN-59
1959	Connector	ARC 16115
1960	Receiver-Transmitter	AN/APX-72
1961	Connector	DPJ59C10-34SB
1962	Receiver-Transmitter	RT-698()/ARC-102
1963	Connector	DPD45-33S1L
1964	Control	C-3940()/ARC-94
1965	Connector	MS3126E20-39S
1966	Control Panel	C-3835/ARC-54
1967	Connector	PT06E24-61S (SR)
1968	Receiver-Transmitter	RT-742/ARC-51BX
1969	Connector	MS3126F16-26S
1970	Control Unit	C-6287/ARC-51BX
1971	Connector	MS3126F18-32S
1972	Control	C-3436A/ARN-30E
1973	Connector	ARC 14050
1974	Control	C-3436/ARN-30D
1975	Receiver-Transmitter	RT-857/ARC-134
1976	Connector	DPX2F40C1SF40C1S33B-003
1977	Control	C-7197/ARC-134
1978	Connector	PT06CP20-39SY
1979	Control	C-7088/ARC-131
1980	Splice	MS25181-1
1981	Receiver, Marker Beacon	R-666/ARN-32
1982	Connector	MM5-11-5-16
1983	Receiver, Marker Beacon	R-122A/ARN-12
1984	Connector	MS3108-18-9S
1985	Terminal Board	MS27212-1-20
1986	Switch	MS35039-23
1987	Resistor	RC20GF101K
1988	Resistor	RC20GF102K
1989	Resistor	RC20GF121K
1990	Resistor	RC20GF151K
1991	Resistor	RC20GF181K
1992	Resistor	RC20GF221K
1993	Resistor	RC20GF331K
1994	Resistor	RC20GF390K
1995	Resistor	RC20GF560K
1996	Resistor	RC20GF561K
1997	Resistor	RC20GF622K
1998	Resistor	RC20GF680K
1999	Resistor	RC20GF820K
2000	Resistor	RC32GF221K

Table 13-1A. Equipment list, supplemental (Sheet 3 of 6)

Item No.	Nomenclature	Part No. or Spec.
2001	Resistor	RC32GF121K
2002	Capacitor	CS13BG186K
2003	Capacitor	CP09A1KF274K3
2004	Voltage Regulator	1589-1C
2005	Voltammeter	22-340-014-1A
2006	Circuit Breaker	C7855-6-200
2007	Relay	AN3025-300
2008	Circuit Breaker	MS25244-50
2009	Switch	MS35059-2
2010	Resistor	1002
2011	Generator	30E20-11B
2012	Filter	97JX703
2013	Connector	AN3106-32-6S
2014	Connector	AN3100-32-6P
2015	Connector	MS3100B28-22P
2016	Connector	MS3106B28-22S
2017	Circuit Breaker	MS39064-2
2018	Connector	MS3100B-32-6P
2019	Connector	MS3106B-32-6S
2020	Switch	RE-275-AR
2021	Circuit Breaker	MS25017-5
2022	Transformer	27F22
2023	Relay	AN3311-2
2024	Phase Adapter	G5524
2025	Terminal Board	MS25123-1-11
2026	Terminal Board	MS25123-1-5
2027	Receiver-Transmitter	RT-348/ARC-54
2028	Mount	MT-1535/ARC-54
2029	Connector	DD50S-C7
2030	Control	KY-28
2031	Connector	MS3126F16-26SW
2032	Control	C-8157/ARC
2033	Connector	MS3126F12-10S
2034	Circuit Breaker	MS25244-5
2035	Antenna	AT-1108
2036	Connector	UG-88E/U
2037	Indicator	ID-1003/ARC-51BX
2038	Air Cooler	HD-615/ARC-51BX
2039	Connector	MS3126F16-26SW
2040	Circuit Breaker	MS24509-15
2041	Filter	A-354
2042	Converter, RMI	CV-1275()/ARN
2043	Indicator	ID-663C/U
2044	Connector	KM6-21-30SNMK2
2045	Blower	2H414YS
2046	Circuit Breaker	D6760-1-15
2047	Relay	MHD6026-5VDC
2048	Switch	MS35058-23
2049	Receiver-Transmitter	RT-384/ARN-52(v)
2050	Connector	MS3106R22-14S
2051	Connector	MS3106R18-9S
2052	Connector	MS3106R18-1P
2053	Connector	MS3106R24-28P

Table 13-1A. Equipment list, supplemental (Sheet 4 of 6)

Item No.	Nomenclature	Part No. or Spec.
2054	Connector	UG1213/U
2055	Control	C-2010/ARN-52(V)
2056	Connector	MS3106R20-27P
2057	Indicator	ID-387/ARN
2058	Connector	MS3106R28-12S
2059	Adapter	UG212C/U
2060	Antenna	AT-741/A
2061	Splice	MS25181-2
2062	Adapter Cable	1560-U8-967
2063	Connector	MS24235M21-30
2064	Switch	MS25002-2
2065	Connector	UG1033/U
2066	Transponder Control	C-2714()/APX-44
2067	Connector	PT06SE18-32S (SR)
2068	Connector	MS24264R22B55P
2069	Circuit Breaker	MS25244-10
2070	Light	MS25041-4
2071	Hood	G71-2A
2072	Connector	DPJ59C10-33PB
2073	Hood	G71-1B
2074	Connector	UG1185/U
2075	Transponder Set	TS-1843()/APX
2076	Connector	MS24226R12B12S
2077	Receiver-Transmitter	RT-494()/APX-44
2078	Connector	UG536A/U
2079	Connector	UG573B/U
2080	Antenna	AT-884
2081	Connector	UG565A/U
2082	Filter	A-605
2083	Connector	MS3124E-12-10P
2084	Connector	MS3124E-16-26PW
2085	Coupler	CU-942/ARC-54
2086	Connector	PT06SE12-10S (SR)
2087	Connector	DM53742-5004
2088	Circuit Breaker	D7271-8-15
2089	Receiver-Transmitter	RT-823()/ARC-131
2090	Mount	MT-3664/ARC-131
2091	Antenna	AS-1703/AR
2092	Terminal Board	MS27212-1-10
2093	Connector	UG913/U
2094	Circuit Breaker	MS24509-15
2095	Resistor	RC20GF750K
2096	Resistor	RC20GF501K
2097	Capacitor	
2098	Relay	MS24149D1
2099	Diode	1N4003
2100	Switch	MS25002-2
2101	Relay	MS24149D1
2102	Relay	MS24149A1
2103	Circuit Breaker	D7271-1-5
2104	Relay	MS25395A1
2105	Diode	1N4003
2106	Filter	A-373

Table 13-1A. Equipment list, supplemental (Sheet 5 of 6)

Item No.	Nomenclature	Part No. or Spec.
2107	Filter	A-418
2108	Inverter	PU-544/A
2109	Connector	MS3106R26-6S
2110	Connector	MS3106R22-5P
2111	Connector	MS3126E16-26S
2112	Relay	MS24143D1
2113	Switch	MS35058-22
2114	Circuit Breaker	MS225361-60
2115	Light Assembly	MS25331-4-313
2116	Filter	GF6646
2117	Power Inverter Mount	PP-3702()/ARC-102
2118	Connector	DEMF-9S
2119	Connector	DEM-9S
2120	Connector	DEM-9P
2121	Diode	1N645
2122	Indicator, RMI	ID-998/ASN
2123	Connector	1406-55SQ
2124	Junction Box, Radio	1560-U8-1063-1
2125	Connector	ARC 14321
2126	Receiver	R-1021()/ARN-30D
2127	Circuit Breaker	D7271-1-3
2128	Relay	6041H80
2129	Connector	94-621-2
2130	Junction Box	661847
2131	Resistor	RC32GF102J
2132	Capacitor	3VDC, 1250 MFD
2133	Shunt, Generator	31-349-01
2134	Junction Box	1560-U8-1045-1
2135	Terminal Board	MS27212-1-6
2136	Magnetic Compass, Standby	
2137	Circuit Breaker	D6761-1-5
2138	Connector	15912
2139	RH Generator Circuit Breaker	PDLM200
2140	LH Generator Circuit Breaker	PDLM200
2141	Microphone	M-34/AIC
2142	Light	MS25041-2-327
2143	Light	MS25041-3-327
2144	Discrete Signal Discriminator	MD736/A
2145	Radio Receiver - Transmitter	RT-855/UPN-25
2146	Antenna	AS-2038/UPN
2147	Switch Box	8476-15010-1
2148	Relay	MS27401-1
2149	Circuit Breaker	MS24509-5
2150	Switch	MS24523-22
2151	Switch	8821K8 (or equivalent)
2152	Coaxial Switch	360-11896-15 (or equivalent)
2153	RF Preamp	AM6151/U
2154	Amplifier Panel	8007-00301-1
2155	Balun Box	8007-00101-1
2156	Mission Indicator	183-9730-1473-602
2157	Footswitch	MS25039-1

Table 13-1A. Equipment list, supplemental (Sheet 6 of 6)

em No.	Nomenclature	Part No. or Spec.
2158	ISO-T Binary Power Divider	TH-50
2159	Light	MS25041-4-327
30	Resistor	RCR07G151JS
61	Connector	UG30EU
2162	Connector	4007-004
2163	Connector	M39012-01-0002
2164	Connector	MC 11E10-6SN
2165	Diode	1N2070
2166	Resistor	RCR07G182JS
2167	Light	A6745AR24
2168	Connector	94-621
2169	Indicator Light	MSZ5041-4-327
2170	Circuit Breaker	MSZ6574-1/2
2171	Cap	1-480699-0
2172	Plug	50-361344-3
2173	Shunt	HA-200-100
2174	Print Circuit Board	50-361314-3

SECTION II WIRING DIAGRAMS

13-13. GENERAL.

13-14. An index of wiring diagrams is contained in Table 13-2. Diagrams are listed in alphabetic order.

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Table 13-2. Index of wiring diagrams (Sheet 5 of 5)

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13-15. WIRING DIAGRAMS.

13-16. The following wiring diagrams represent equipment and components in the aircraft. They are identified as to which aircraft configuration they represent. Each item in the diagram is

assigned an item number for identification purposes. The item list (table 13-1 and table 13-1A) identifies the item by the number assigned to it.

EFFECTIVE ON AIRCRAFT
SERIAL NO.:

56-3695 THRU 56-3738, 57-3084 THRU 57-3101,
57-6029 THRU 57-6094, 58-1329 THRU 58-1364,
(EXCEPT 58-1354 THRU 58-1356), 58-3048 THRU
58-3092, 59-2535 THRU 59-2538,
AND 59-4990 THRU 59-4992

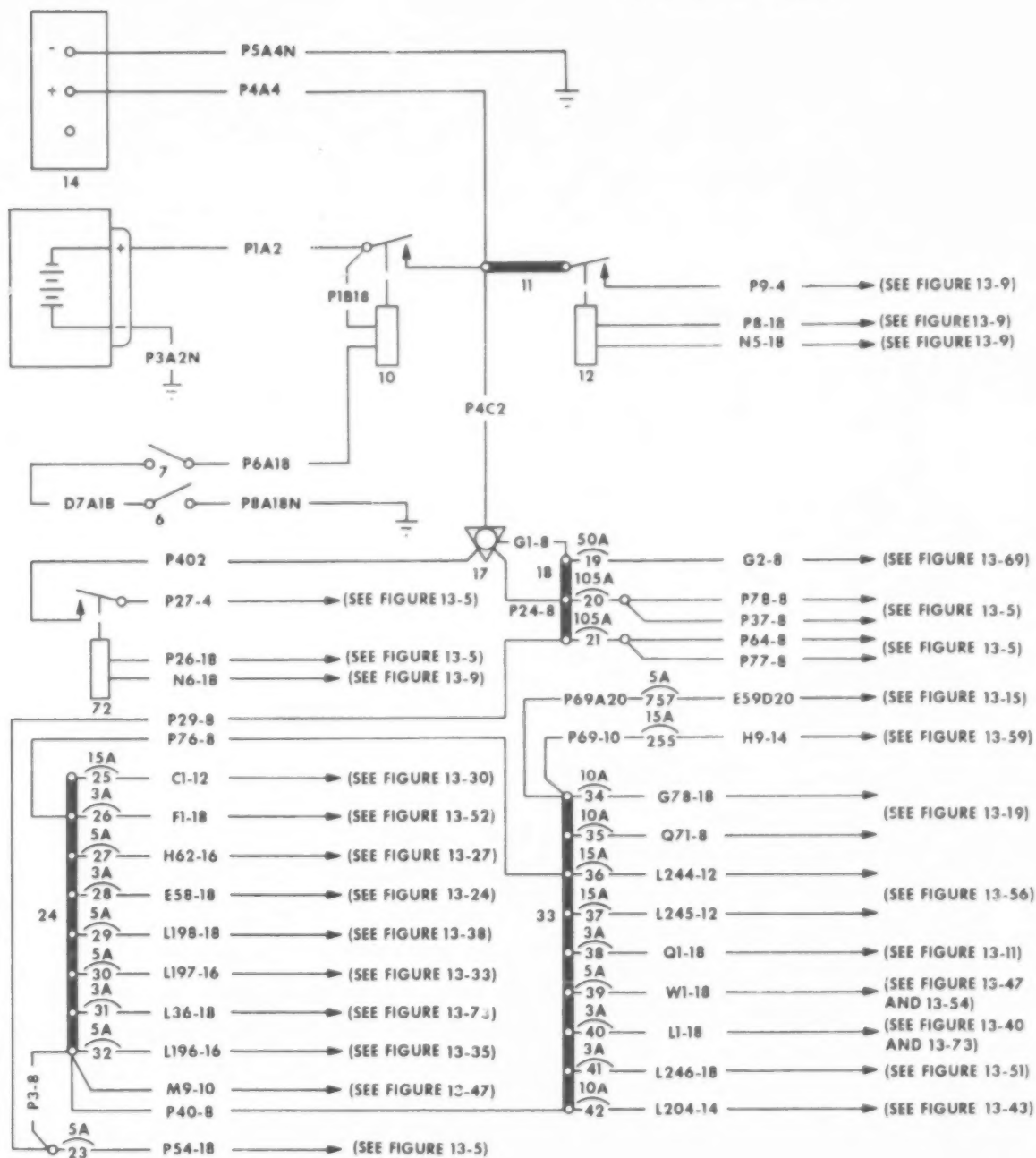


Figure 13-3. Power distribution circuit U-8D (Sheet 1 of 2)

Chart5 Transposed to

End of Volume.

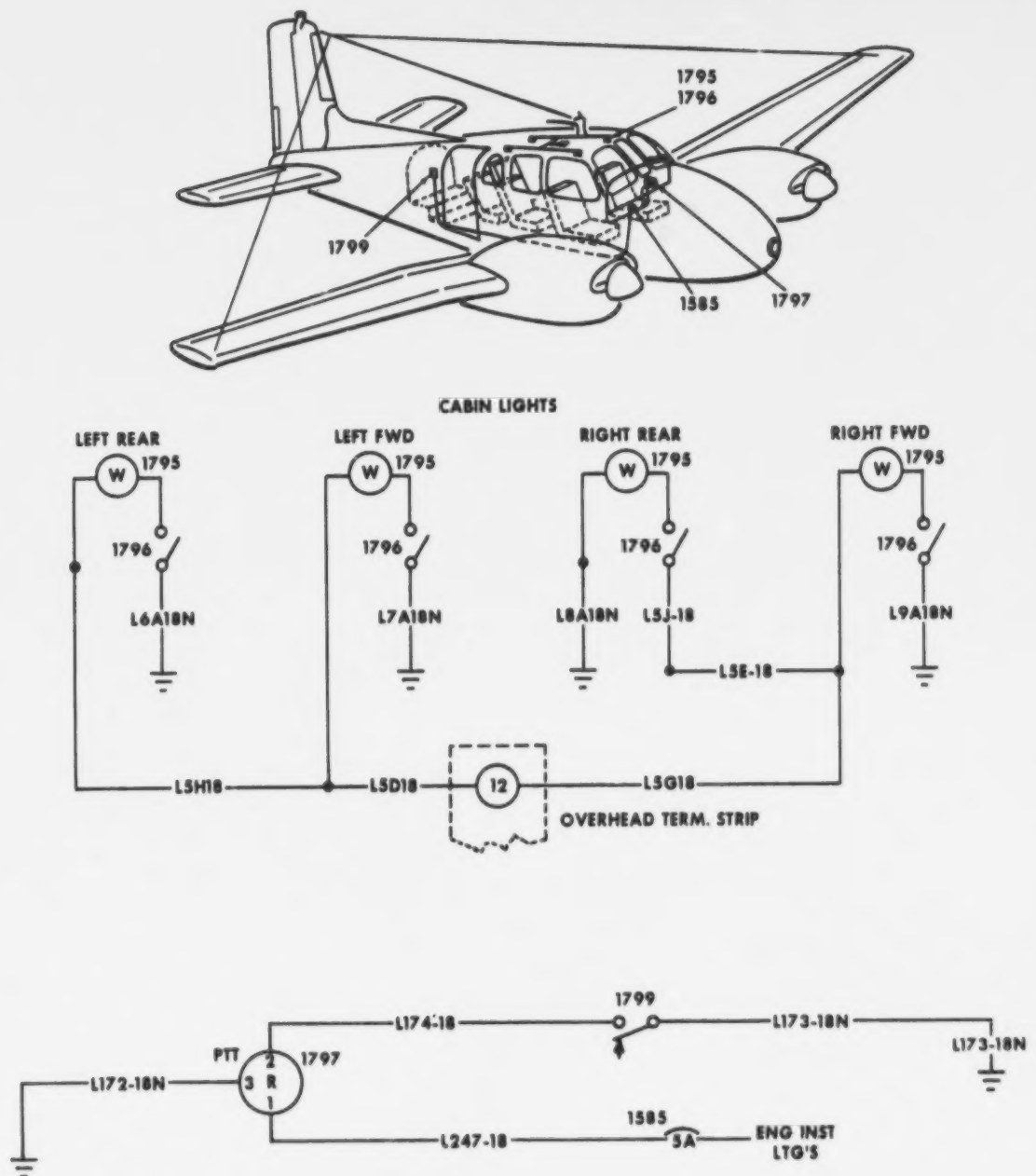


Figure 13-154. Cabin lights and fuselage step warning lights RU-8D

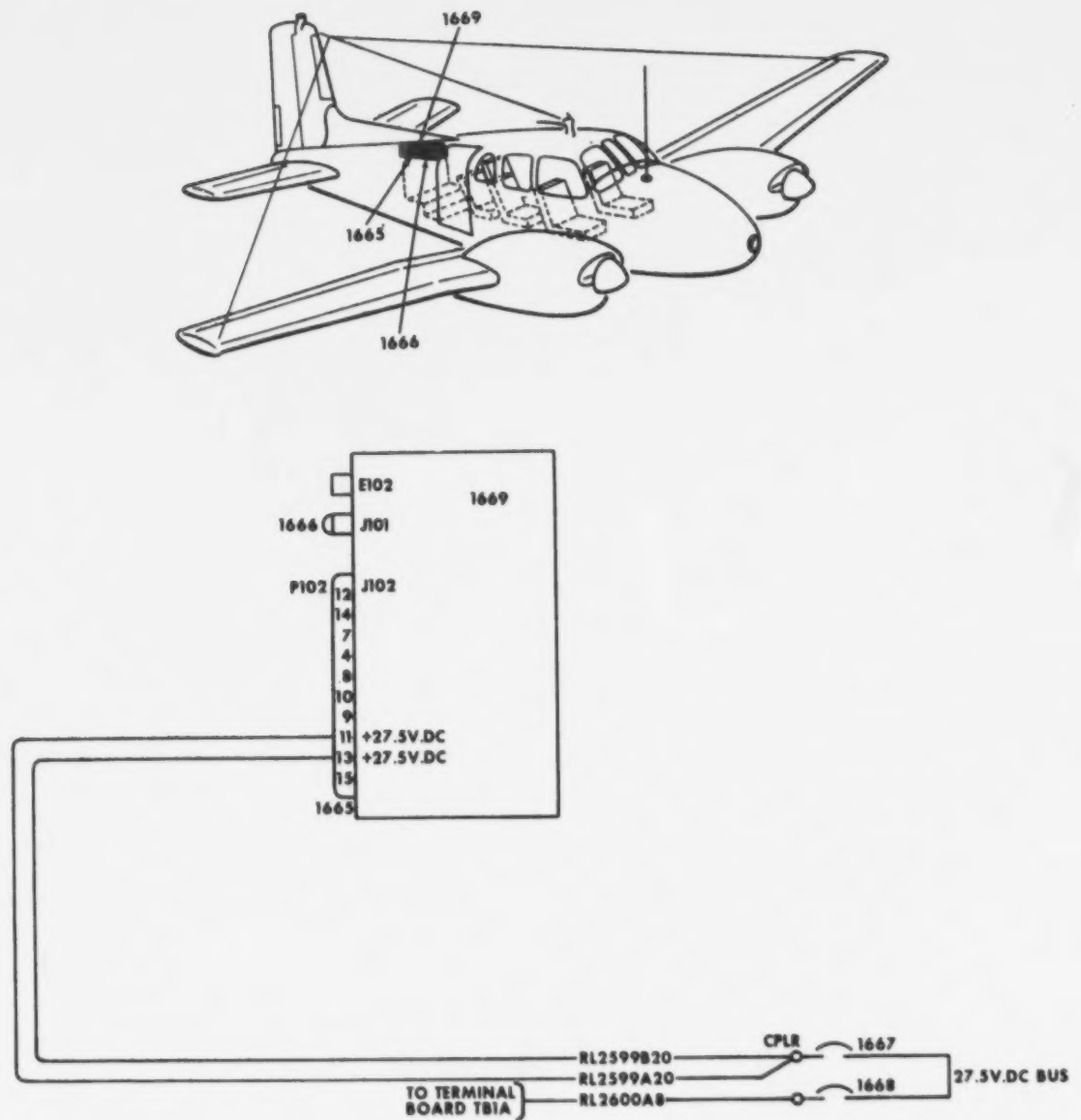


Figure 13-156. AN/ARC-102 antenna coupler circuit U-8G

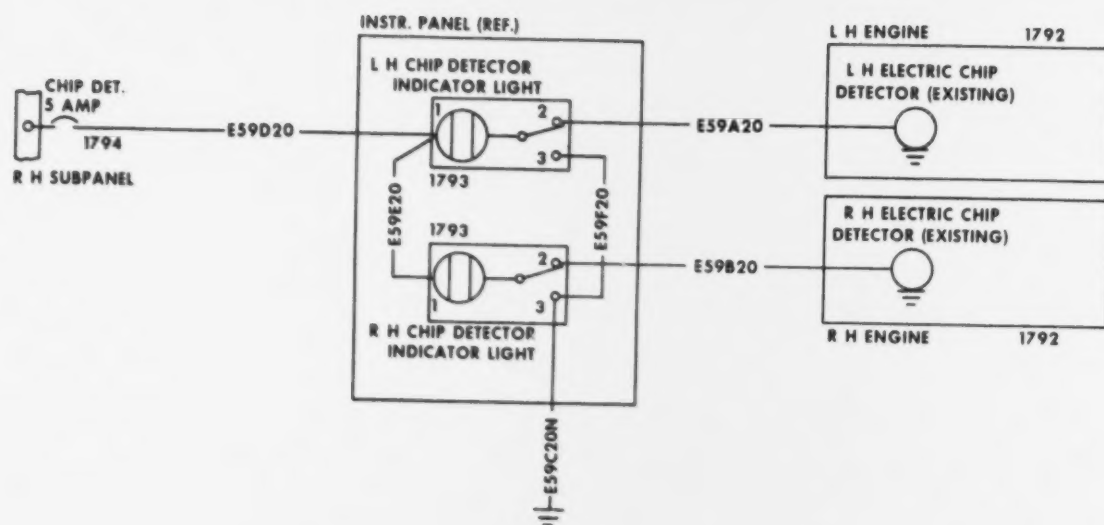
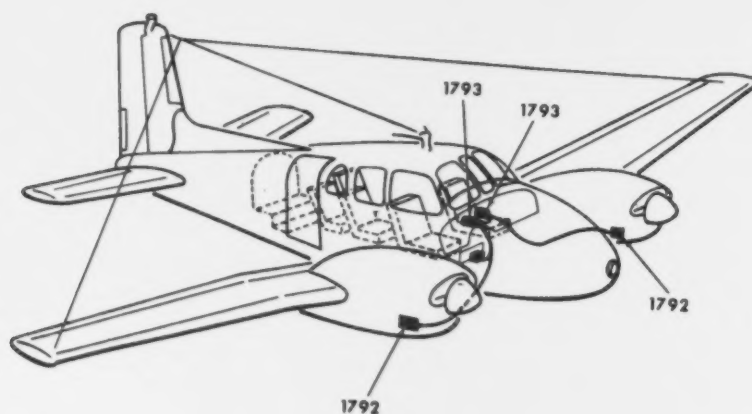


Figure 13-157. Chip detector circuit U-8G

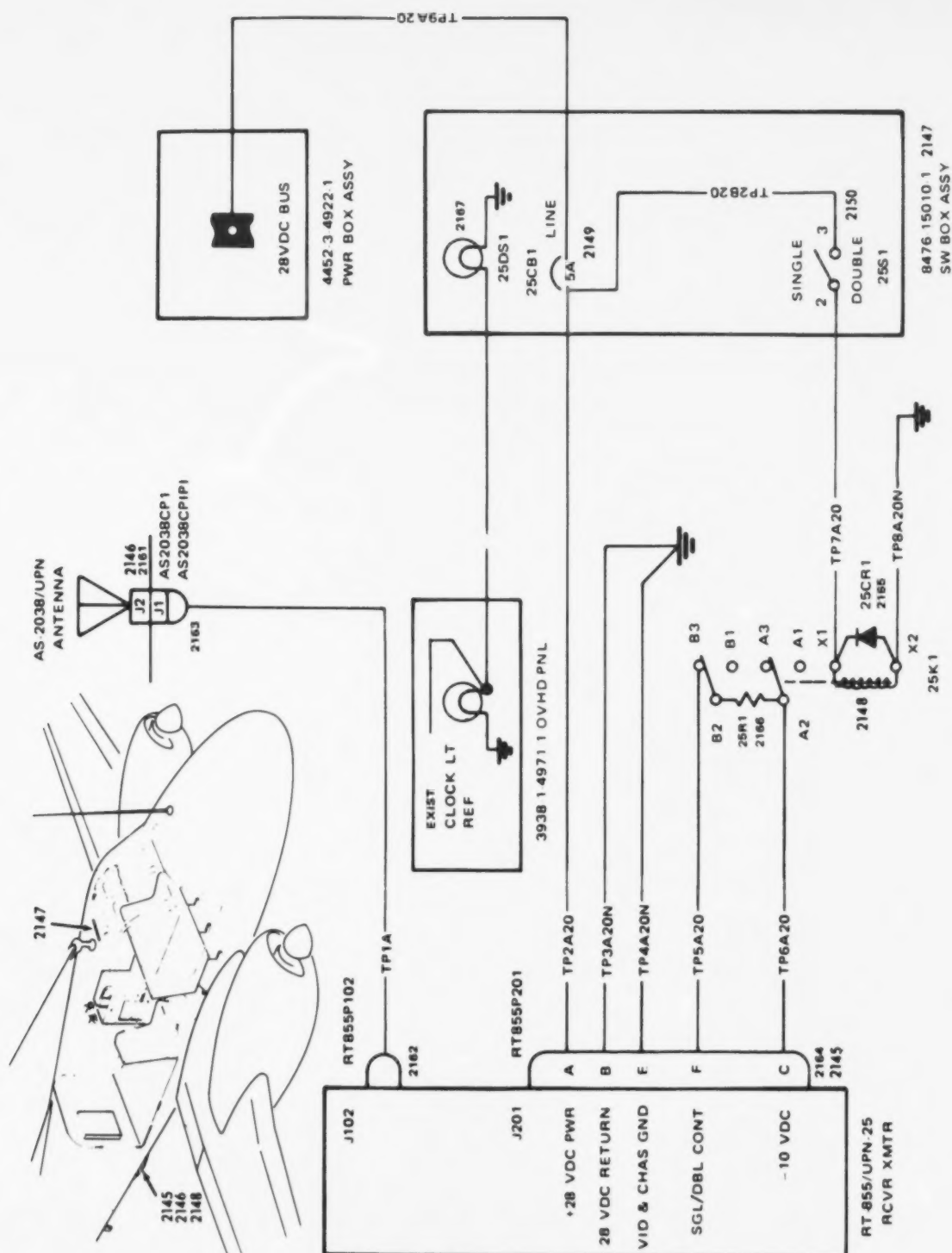


Figure 13-158. Radar Beacon RU-8D

CHAPTER 14
AVIONICS, PHOTOGRAPHY, AND ARMAMENT
SECTION I AVIONICS AND PHOTOGRAPHY

Refer to Appendix A for appropriate organizational maintenance manuals covering avionics and photography systems for Army Model U-8 aircraft.

SECTION II ARMAMENT

Not Applicable

CHAPTER 15
EXTERNAL STORES - NONARMAMENT

Not Applicable

CHAPTER 16

STORAGE OF AIRCRAFT

SECTION I SCOPE

16-1. INTRODUCTION.

16-2. The storage instructions defined herein apply to limited periods of storage (up to 180 days) depending on the aircraft status as operational reserve, or for reasons of minor repair, modification, reassignments, or disposition actions. Preparation for storage, whether for flyable storage (no time limit), short term storage (1 to 45 days), or intermediate storage (46 to 180 days), must be in complete accordance with the applicable instructions contained in Section II. These instructions include (as applicable) removal references, inspections, treatment of corroded areas, cleaning, preservation, and depreservation. Instructions are included in Section III for destroying the aircraft to prevent enemy use.

16-3. FLYABLE STORAGE (No time limit).

16-4. Flyable storage is the prescribed procedure to maintain a stored aircraft in an operable condition. Next to daily use this keeps the aircraft in the best possible condition. It does, however, require attention periodically.

16-5. SHORT TERM STORAGE (From 1 to 45 DAYS).

16-6. This type of storage is used to store a aircraft up to 45 days with very little attention during the storage period.

16-7. INTERMEDIATE STORAGE (From 46 to 180 days).

16-8. An aircraft that will be inactive for more than 45 days but not exceeding 180 days, shall be prepared and maintained in intermediate storage.

16-9. RESPONSIBILITY.

16-10. The local maintenance officer shall be responsible for processing an aircraft into storage in accordance with existing directive. He shall use the minimum requirements and take into consideration the length of time it will be in storage and local climatic conditions. These requirements shall be sufficient to ensure that airframe, systems, components, and assemblies are processed into a satisfactory state of preservation.

16-11. Where it is necessary to place an aircraft in storage, care shall be taken by the responsible activity to ensure that the stored aircraft can be removed from storage with a minimum of man-hours and requirement for parts.

16-12. Storage of aircraft awaiting IROAN, modification, repair, or return to the activity to which assigned shall be arranged and accomplished by each activity to meet its local requirements.

16-13. EQUIPMENT REMOVAL AND RETENTION INSTRUCTIONS.

16-14. Prior to storage of the aircraft, obtain instructions from the proper authority to determine which items of equipment are to be removed from the aircraft. For instructions covering the removal of an item of equipment,

refer to the Maintenance Allocation Chart (Appendix B) to determine the maintenance level responsibility of the item to be removed, and then

refer to the index for the paragraph number in which the authorized removal procedure is presented.

SECTION II PROCEDURES

16-15. PROCEDURES.

16-16. This section contains information on the procedures used in parking and mooring; inspection; preparation for flyable, short term, or intermediate storage; and activation after flyable, short term or intermediate storage.

16-17. PARKING AND MOORING PROCEDURES.

16-18. Parking and mooring for flyable storage under normal or high wind conditions must be accomplished in accordance with instructions contained in paragraphs 1-99 and 1-100. Additional instructions to be complied with when processing aircraft into short term or intermediate storage are as follows:

- a. Leave parking brake off.
- b. Rotate nylon tires every 3 days. Tires other than nylon will be rotated every 30 days until such time as the aircraft is placed on blocks and the weight relieved from the tires.
- c. Deflate main and nose landing gear struts by loosening filler plugs on top of landing gear struts by loosening filler plugs on top of landing gear struts approximately one turn to release air pressure; then remove filler plug.

WARNING

Because of the danger of the plug blowing free with sufficient force to injure personnel, always loosen the plug enough to allow the air pressure behind it to dissipate before completely removing plug.

- d. Clean exposed portion of landing gear strut pistons and apply a coat of preservative hydraulic fluid (item 32, table 1-8).

- e. Fill landing gear struts with hydraulic fluid (item 3, table 1-8) to a level even with bottom of filler plug port and reinstall plug.

- f. Lower aircraft. If landing gear struts do not completely deflate, carefully loosen filler plug on top of strut approximately one turn and allow excess oil to escape until struts are 1/4- to 1/2-inch from completely deflated. Tighten plug.

- g. Seal all exposed lines and fittings if engine is removed.

CAUTION

If the aircraft is to be stored with one or both engines removed, a suitable stand will be placed under the empennage for support due to the shift in the center of gravity.

- h. Remove from vicinity and objects likely to strike aircraft during high wind conditions.

16-19. INSPECTION PROCEDURES.

16-20. Prior to placing an aircraft in flyable storage, perform inspection in accordance with TM 55-1510-201-20PMS (Daily). Aircraft placed in short term or intermediate storage will be inspected in accordance with TM 55-1510-201-20PMS (Intermediate). Organizational maintenance officers shall be responsible for establishing an inspection program to ensure that the following inspection procedures outlined in paragraphs 16-21 through 16-26 are performed periodically.

16-21. INSPECTION DURING FLYABLE STORAGE.

16-22. Inspection during flyable storage necessitates periodic check as follows:

- a. Remove all protective covers and shields.
- b. Perform inspection in accordance with TM 55-1510-201-20PMS (Daily).
- c. Check mooring ropes for security and

- sufficient slack, and mooring points for damage.
- d. Inspect aircraft immediately after being subjected to high-velocity winds exceeding 35 knots.
- e. Rotate nylon tires every 3 days.
- f. Install all protective covers and shields.

16-23. INSPECTION DURING SHORT TERM STORAGE.

16-24. Inspection for aircraft in storage for a period of 1 to 45 days necessitates periodic checks as follows:

- a. Accomplish inspection procedures outlined in paragraph 16-21, substituting TM 55-1510-201-20PMS (Intermediate), in step b.
- b. Carefully inspect at regular intervals of 15 days and treat for corrosion, if necessary, all aircraft placed in storage where local average humidity exceeds 40 percent. Where local average humidity is 40 percent or less, inspect and treat aircraft for corrosion every 30 days. In conducting an inspection for corrosion, pay particular attention to those areas where moisture deposits will not evaporate rapidly. Normally, corrosion will not be as prevalent on painted surfaces as on unpainted surfaces; however, under some conditions, corrosion may attack the metal through the paint. In such cases, paint on the affected areas will be blistered or scaly in appearance.
- c. If interior temperature of aircraft exceeds 160°F (71°C), ventilate aircraft by opening the windows and door. If necessary, promote air circulation by use of fans.
- d. Inspect engine cylinder dehydrator plugs weekly and replace as soon as color indicates unsafe conditions.

NOTE

If dehydrator plugs have changed color in one-half or more of the cylinders, also replace dehydrating agent in air intake.

- e. Check condition of oil film on exposed parts of propeller. Restore oil film if required.
- f. Inspect for signs of oil or hydraulic fluid leaks.
- g. Inspect exposed portion of all hydraulic actuator pistons for adequate hydraulic fluid coating.
- h. Rotate tires on aircraft after 30 days if aircraft is not blocked up. Nylon tires must be rotated every 3 days. Maintain a minimum air pressure of 75 percent normal in all tires. (Refer to paragraph 1-141).

16-25. INSPECTION DURING INTERMEDIATE STORAGE.

16-26. Inspection for aircraft in storage for a period of 46 to 180 days necessitates periodic checks as follows:

- a. Accomplish inspection procedures outlined in paragraph 16-23.
- b. Inspect avionic equipment for deterioration. If deterioration is present, remove major components and store in appropriate facility.

16-27. PREPARATION FOR FLYABLE STORAGE. (No time limit).

16-28. Aircraft in this storage category will be maintained in a serviceable condition in accordance with the following instructions:

- a. Perform inspection in accordance with TM 55-1510-201 PMS (Daily), every three days.
- b. Turn engines by hand, pull thru five revolutions every three days.
- c. After thirty days, the aircraft should be flown 30 minutes or ground runup should be made long enough to obtain normal operating temperatures. Avoid excessive ground runup.
- d. Clean exposed portion of all hydraulic actuator pistons and coat with hydraulic fluid, (item 3, table 1-8).
- e. Clean aircraft in accordance with paragraph 1-159.

f. Park and moor aircraft in accordance with paragraphs 1-99 and 1-103.

g. Install all protective covers and shields.

16-29. PREPARATION FOR SHORT TERM STORAGE (1 to 45 days).

16-30. Aircraft being placed inactive for a period between 1 and 45 days must be prepared for storage in accordance with paragraphs 16-31 through 16-52. Contingent upon their status, aircraft under repair, modification, etc, must also receive storage treatment compatible with the condition of the aircraft. An inspection must be performed in accordance with TM 55-1510-201-20PMS (Intermediate).

16-31. ENGINES.

16-32. Preserve engines in accordance with TM 55-1500-204-25/1.

16-33. PROPELLERS.

16-34. Apply a light film of lubricating oil (item 2, table 1-8) to all metal surfaces.

16-35. CARBURETOR - FUEL INJECTOR PUMP.

16-36. Prepare the carburetor or fuel injector pump for short term storage as follows:

a. Prepare carburetor used with U-8D, U-8G, and RU-8D aircraft for short term storage in accordance with steps (1) through (6).

(1) Place carburetor controls in normal operating position. Move manual mixture control to RICH position and throttle to OPEN position.

(2) Remove plug that is below and to the left of carburetor main metering jet plug. Remove drain plug from bottom of regulator cover. Remove fuel strainer assembly, and drain fuel from carburetor. Thoroughly drain carburetor and then replace plugs and strainer.

(3) Drain any moisture from air section of regulator by removing pipe plug from end of manual mixture control assembly. Replace plug immediately.

(4) Connect an oil supply line to carburetor fuel inlet and inject oil (item 55, table 1-8) into carburetor at 5 psi. Inject oil until oil flows from discharge bar. An excessive flow of oil from discharge bar is not necessary.

CAUTION

The flushing oil must not be allowed to enter the air section of the carburetor.

(5) Drain flushing oil from carburetor by removing drain plug from bottom of regulator cover.

(6) Attach a tag to carburetor stating the following: **THIS CARBURETOR HAS BEEN PRESERVED. FLUSH WITH STANDARD OPERATING FUEL BEFORE PLACING IN SERVICE.**

b. Prepare fuel injector pump used with U-8F aircraft for short term storage in accordance with steps (1) through (3).

(1) Remove plug located at lowest point of fuel injector pump distributor block and drain fuel from pump.

(2) Flush fuel injector pump with lubricating oil (item 55, table 1-8); allow oil to drain and replace plug.

(3) Tag fuel injector pump to indicate preservation.

16-37. FUEL SYSTEM.

16-38. The fuel system may be preserved by two methods. The method to be used will be determined by the availability of preserving oil and equipment.

WARNING

In the interest of safety of personnel and equipment, the following precautions must be observed while preparing aircraft fuel tanks for storage:

The aircraft and all equipment used in performing the operation must be properly grounded. This includes defueling equipment, work stands, purging equipment, and any powered or pneumatic devices. Work stands shall be equipped with a personnel static discharge plate of copper or zinc plate, which shall be affixed in such a position that personnel can contact the plate before coming in contact with the aircraft. High static electrical charges are created by the contact and separation of unlike substances, or by any sort of motion of persons or ma-

terial, and are a constant source of danger when generated in the presence of fuels or flammable vapors.

When using a fire extinguisher bottle as a source of CO₂ for purging fuel tanks, regardless of the size of the bottle used, the fiber horn shall be removed, not only because it is too large for insertion into the tank filler neck, but to avoid generating static electrical charges which can build up by gas moving rapidly through the horn. The nozzle as well as the bottle itself must be grounded to the aircraft. The CO₂ must be discharged into fuel tanks slowly, at a rate of one pound per minute. CO₂ must be released slowly because of the rapid passage of the gas through a hose can generate static electricity. In addition to this, a very rapid rate of discharge allows rapid expansion of the CO₂ gas when it flows into a fuel cell. The expanding gas can lower the temperature to the point that it will cause damage to the cell.

Fuel tanks should not be drained near the end of the working day and then allowed to stand "empty" over night. Such action could make a perfect set of conditions for producing explosive vapors. The fact is that the system is not completely empty. Residue fuel drains down the sides of the tank and forms puddles. During the night fuel from these puddles evaporates into the air in the tank and if the critical fuel-air ratio develops an explosion could be set off by a spark. The remedy is to avoid such a lapse of time between draining and purging.

The size of the CO₂ bottle to be used can be varied to meet existing conditions. The 15 pound size is handy to use. The total amount recommended is based on the quantity usually needed to purge a tank or tanks of the size under discussion. However, more may be needed to obtain a safe reading on the combustible gas indicator.

It is permissible to use nitrogen or other inert gas in place of the CO₂ gas called out in any of the purging procedures. The same precautionary measures stated above will be observed.

- a. If an oil tank of at least 85 gallons capacity

and an adequate supply of oil is available, preserve the fuel system as follows:

NOTE

Have an approved type fire extinguisher manned by competent personnel available during servicing and treatment of the fuel systems.

- (1) Drain all fuel from fuel system. (Refer to paragraph 1-128).

CAUTION

Before draining the fuel system, make sure all vents are open and all filler caps are removed to prevent the collapsing of the bladder-type fuel tanks. Fuel boost pumps will not be used during defueling or treating of the fuel system.

- (2) Refill fuel tanks to capacity with lubricant (item 33, table 1-8).

(3) Inspect all drain cocks for presence of water, and drain as necessary. Close and re-safety all drains as required.

(4) Actuate fuel tank selector valve handles through all positions, then place handles in OFF position.

(5) Remove fuel filter screens from selector valves located in main landing gear wheel wells and reinstall caps and gaskets.

(6) Disconnect fuel inlet line from engine-driven fuel pumps.

(7) Position fuel tank selector valve handles on fuel system control panel of U-8D, U-8G, and RU-8D aircraft to CROSSFEED position. Allow sufficient oil flow to fill selector valve bodies and coat interior of fuel lines. Turn fuel tank selector valve handles to OFF position. Coat fuel filter screens with oil and reinstall screens in selector valves.

(8) Position fuel tank selector valve handles on fuel system control panel of U-8F aircraft to LEFT ENG and RIGHT ENG. Place CROSSFEED VALVE switch to OPEN position and allow sufficient oil flow to fill selector valve bodies and coat interior of fuel lines. Turn fuel tank selector valve handles to OFF position and place CROSSFEED VALVE switch in CLOSED position. Coat fuel filter screens with oil and reinstall screens in selector valves.

(9) Plug open end of fuel inlet line previously disconnected from engine-driven fuel pump.

- (10) Drain or pump preservative oil from

fuel tank leaving only a film adhering to inner liner as protection against deterioration. Removed oil may be used for treatment of other fuel systems. After draining, replace all filler caps.

(11) Attach tags to carburetor (U-8D, U-8G, and RU-8D) or to the fuel injector pump (U-8F), and each fuel filler cap. Tags are to read as follows: FUEL SYSTEM HAS BEEN PRESERVED WITH LUBRICATING OIL, MILITARY SPECIFICATION MIL-O-6081. FLUSH ENTIRE SYSTEM, INCLUDING ALL TANKS AND CARBURETOR (or INJECTOR PUMP), WITH STANDARD FUEL BEFORE PLACING IN SERVICE.

h. If proper equipment is not available or supply of oil is limited, use the following procedure to preserve fuel system:

(1) Drain all fuel from fuel system. (Refer to paragraph 1-128).

CAUTION

Before draining the fuel system, make sure all vents are open and all filler caps are removed to prevent the collapsing of the bladder-type fuel tanks. Fuel boost pumps will not be used during defueling or treating of the fuel system.

(2) Pour approximately 5 gallons of lubricant (item 33, table 1-8) into each fuel tank.

(3) Inspect all drain cocks for presence of water, and drain as necessary. Close and re-safety all drains as required.

(4) Actuate fuel tank selector valve handles through all positions, then place handles in OFF position.

(5) Remove fuel filter screens from selector valves located in main landing gear wheel wells and reinstall caps and gaskets.

(6) Disconnect fuel inlet line from engine-driven fuel pumps.

(7) Position fuel tank selector valve handles on fuel system control panel of U-8D, U-8G, and RU-8D aircraft to CROSSFEED position. Allow sufficient oil flow to fill selector valve bodies and coat interior of fuel lines. Turn fuel tank selector valve handles to OFF position. Coat fuel filter screens with oil and reinstall screens in selector valves.

(8) Position fuel tank selector valve handles on fuel system control panel of U-8F aircraft to LEFT ENG and RIGHT ENG. Place CROSSFEED VALVE switch to OPEN position and allow sufficient oil flow to fill selector valve bodies and coat interior of fuel lines. Turn fuel tank selector valve handles to OFF position and

place CROSSFEED VALVE switch in CLOSED position. Coat fuel filter screens with oil and reinstall screens in selector valves.

(9) Plug open end of fuel inlet line previously disconnected from engine-driven fuel pump.

(10) Drain remaining oil from fuel tanks.

(11) Remove access plate just outboard of each nacelle on each wing leading edge; then remove bolts securing fuel tank access cover to tank and remove cover.

(12) Remove bolts securing fuel filler necks to aircraft structure and remove filler necks.

(13) Remove fuel boost pumps. (To be accomplished by direct support personnel.)

(14) Working through openings, wipe inside walls of all fuel cells with oil (item 33, table 1-8).

(15) Replace fuel boost pumps. (To be accomplished by direct support personnel.)

(16) Install fuel filler necks and access covers in fuel tanks.

(17) Attach tags to carburetor (U-8D, U-8G, and RU-8D) or to fuel injector pump (U-8F) and to each fuel filler cap. Tags are to read as follows: FUEL SYSTEM HAS BEEN PRESERVED WITH LUBRICATING OIL, MILITARY SPECIFICATION MIL-O-6081. FLUSH ENTIRE SYSTEM, INCLUDING ALL TANKS AND CARBURETOR (or INJECTOR PUMP), WITH STANDARD FUEL BEFORE PLACING IN SERVICE.

16-39. BATTERY, BATTERY COMPARTMENT, AND VENTING SYSTEM.

16-40. Preserve battery system as follows:

a. Remove battery. (Refer to paragraph 12-211 or 12-221.) Maintain battery in accordance with TM 55-1500-204-25/1.

b. Wrap battery quick-disconnect terminal block with barrier material (item 9, table 1-8) and secure to battery tie-down bolt.

c. Remove battery sump jar, clean with solution of sodium bicarbonate (item 20, table 1-8), and reinstall.

d. Plug battery vent outlet.

16-41. ALIGHTING GEAR.

16-42. Preserve alighting gear as follows:

a. Accomplish procedures outlined in paragraph 17-17 step c through f.

b. Clean brake assemblies and apply a coating of primer (item 35, table 1-8) to brake discs.

c. Apply corrosion preventive compound (item 34, table 1-8) to all unpainted surfaces on landing gear and wheels.

CAUTION

Do not apply corrosion preventive compound to exposed surface of the landing gear strut piston or to the extended polished surfaces of hydraulic cylinders.

d. Brush or spray coating compound (item 36, table 1-8) on all tires to prevent moisture entering between tire and wheel rim.

e. Protect tires from fuel, oil, and hydraulic fluid with locally manufactured tire covers of barrier material (item 9, table 1-8).

16-43. FIRE EXTINGUISHERS AND FIRST AID KITS.

16-44. The fire extinguishers and first aid kits must remain stored in the aircraft.

16-45. INSTRUMENTS.

16-46. Instruments must remain installed in the aircraft. Seal static openings and drain holes in pitot head with tape (item 37, table 1-8).

16-47. AVIONICS.

16-48. Preserve avionic equipment as directed locally.

16-49. AIRFRAME.

16-50. Preserve airframe as follows:

a. Clean aircraft in accordance with paragraph 1-159.

b. Accomplish procedures outlined in paragraph 1-157 if evidence of corrosion is found after cleaning.

16-51. PARKING AND MOORING.

16-52. Park and moor aircraft in accordance with paragraph 16-17. Install all protective covers and shields.

16-53. PREPARATION FOR INTERMEDIATE STORAGE (46 TO 180 DAYS).

16-54. Aircraft being placed inactive for a period between 46 and 180 days must be prepared for storage in accordance with paragraph 16-55

through 16-75. Contingent upon their status, aircraft undergoing repair, modification, etc., must also receive storage treatment compatible with the condition of the aircraft. Perform inspection in accordance with TM 55-1510-201-20PMS (Intermediate).

16-55. ENGINES.

16-56. Preserve engines in accordance with TM 55-1500-204-25/1

16-57. PROPELLERS.

16-58. Clean exposed surfaces with dry cleaning solvent (item 6, table 1-8), then coat with corrosion preventive compound (item 30, table 1-8).

16-59. CARBURETOR / FUEL INJECTOR PUMP.

16-60. Preserve carburetors (U-8D, U-8G, and RU-8D) or fuel injector pumps (U-8F) in accordance with paragraph 16-35.

16-61. FUEL SYSTEM.

16-62. Preserve fuel system in accordance with paragraph 16-37.

16-63. BATTERY, BATTERY COMPARTMENT, AND VENTING SYSTEM.

16-64. Preserve the battery, battery compartment, and venting system in accordance with paragraph 16-39.

16-65. ALIGHTING GEAR.

16-66. Preserve alighting gear in accordance with paragraph 16-41.

16-67. FIRE EXTINGUISHERS AND FIRST AID KITS.

16-68. Remove fire extinguishers and first aid kits, tag for condition, and transfer to supply.

16-69. INSTRUMENTS.

16-70. Preserve instruments as follows:

a. Remove clock only, tag for condition, and transfer to supply.

b. Seal static openings and drain holes in pitot head with tape (item 37, table 1-8).

16-71. AVIONICS.

16-72. Preserve avionic equipment as directed locally.

16-73. AIRFRAME.

16-74. Preserve airframe as follows:

a. Clean aircraft in accordance with paragraph 1-159.

b. Accomplish procedures outlined in paragraph 1-157 if evidence of corrosion is found after cleaning.

c. Clean all exposed antennas and connections, and coat with corrosion preventive compound (item 30, table 1-8).

d. Cover all windows with 0.008-inch thick coat of protective coating (item 38, table 1-8) to cover and overlap each window by 2 inches.

e. Treat all bare or bright sections of control cables with a light coat of grease (item 39, table 1-8).

f. Check all external removable panels for close fit. If panels are likely to admit moisture, seal with pressure sensitive tape (item 37, table 1-8).

16-75. PARKING AND MOORING.

16-76. Park and moor aircraft in accordance with paragraph 16-17. Install all protective covers and shields.

16-77. ACTIVATION AFTER FLYABLE STORAGE.

16-78. Aircraft returning to operational status after flyable storage must be depreserved in accordance with paragraphs 16-79 through 16-82.

16-79. AIRFRAME.

16-80. Remove all protective covers and shields. Perform inspection in accordance with TM 55-1510-201-20PMS (Daily).

16-81. ENGINE.

16-82. Actuate engine as follows:

a. If engine has been preserved, depreserve in accordance with TM 55-1500-204-25/1.

b. If engine was not preserved, perform a complete runup in accordance with applicable operator's manual (-10).

16-83. ACTIVATION AFTER SHORT TERM STORAGE.

16-84. Aircraft returning to operational status after short term storage must be depreserved in accordance with paragraphs 16-85 through 16-100 to restore them to operational condition.

16-85. AIRFRAME.

16-86. Remove all protective covers and shields. Perform inspection in accordance with TM 55-1510-201-20PMS (Intermediate).

16-87. ENGINES.

16-88. Depreserve engines in accordance with TM 55-1500-204-25/1.

16-89. CARBURETOR/FUEL INJECTOR PUMP.

16-90. Activate carburetor or fuel injector as follows:

a. Thoroughly flush carburetors (U-8D, U-8G, and RU-8D), or fuel injector pumps (U-8F) with gasoline (item 1, table 1-8).

b. Allow carburetors or injector pumps to stand filled with gasoline for 8 hours.

CAUTION

This soaking period is necessary to restore the fuel diaphragms and packing, preformed to proper operating condition.

16-91. FUEL SYSTEM.

16-92. Activate fuel system as follows:

a. Flush fuel system with standard fuel to remove all oil prior to connecting fuel inlet line to engine-driven fuel pump.

b. Inspect fuel cells for general condition.

c. Inspect all fuel cell fitting attachment

bolts and hose clamps, and retighten to proper torque in accordance with applicable directive.

16-93. BATTERY, BATTERY COMPARTMENT, AND VENTING SYSTEM.

16-94. Activate battery system as follows:

- a. Ensure battery compartment is clean.
- b. Remove barrier material from battery quick-disconnect terminal block.
- c. Install serviceable battery. (Refer to paragraph 12-211 or 12-221.)
- d. Remove plug from battery vent outlet.

16-95. ALIGHTING GEAR.

16-96. Activate alighting gear as follows:

- a. Remove protective coatings and barrier material from all struts, wheels, and tires.
- b. Remove primer coating from brake discs with paint remover (item 40, table 1-8).
- c. Service and inflate landing gear struts. (Refer to paragraph 1-142).

16-97. FIRE EXTINGUISHERS AND FIRST AID KITS.

16-98. Ensure that all fire extinguishers and first aid kits are fully serviced and installed.

16-99. INSTRUMENTS.

16-100. Remove tape from static openings and drain holes in pitot head.

16-101. ACTIVATION AFTER INTERMEDIATE STORAGE.

16-102. Aircraft returning to operational status after intermediate storage must be depreserved in accordance with paragraphs 16-103 through 16-119 to restore them to operational condition. Perform inspection in accordance with TM 55-1510-201-20PMS (Intermediate).

16-103. AIRFRAME.

16-104. Activate airframe as follows:

- a. Remove all protective covers and shields.
- b. Remove protective coating from all antennas with dry cleaning solvent (item 6, table 1-8).

c. Strip protective coating from windows and clean in accordance with paragraph 1-159.

CAUTION

Do not use steam or unauthorized cleaning compounds to remove protective coating from windows.

d. Remove tape from access panels.

16-105. ENGINES.

16-106. Depreserve engines in accordance with TM 55-1500-204-25/1.

16-107. CARBURETOR/FUEL INJECTOR PUMP.

16-108. Depreserve carburetors (U-8D, U-8G, and RU-8D) or fuel injector pumps (U-8F) in accordance with paragraph 16-89.

16-109. FUEL SYSTEM.

16-110. Depreserve fuel system in accordance with paragraph 16-91.

16-111. PROPELLERS.

16-112. Remove corrosion preventive compound from propellers with dry cleaning solvent (item 6, table 1-8).

16-113. BATTERY, BATTERY COMPARTMENT, AND VENTING SYSTEM.

16-114. Depreserve battery system as follows:

- a. Ensure battery compartment is clean.
- b. Remove barrier material from battery quick-disconnect terminal block.
- c. Install serviceable battery. (Refer to paragraph 12-211 or 12-221.)

16-115. ALIGHTING GEAR.

16-116. Depreserve alighting gear in accordance with paragraph 16-95.

16-117. FIRE EXTINGUISHERS AND FIRST AID KITS.

16-118. Ensure that all fire extinguishers and first aid kits are fully serviced and installed.

16-119. INSTRUMENTS.

16-120. Depreserve instruments as follows:

- a. Remove tape from static openings and drain holes in pitot head.
- b. Install serviceable clock.

SECTION III DEMOLITION**16-121. DEMOLITION.**

16-122. When capture or abandonment of the aircraft to the enemy is imminent, the responsible unit commander must make the decision either to destroy the aircraft or to render it inoperative. Based on this decision, orders are issued which cover the desired extent of destruction. The care and handling of explosives are outlined in FM 5-25.

CAUTION

Do not destroy the aircraft, except upon the order of proper authority.

16-123. DESTRUCTION BY EXPLOSIVES.

16-124. Place as many charges as the situation permits and detonate them simultaneously with detonating cord and a suitable detonator. Provide for dual methods of detonation to minimize the possibility of misfire.

WARNING

Observe all appropriate safety precautions in FM 5-25.

- a. Remove and empty fire extinguishers.
- b. Place one 1-pound TNT charge or equivalent in left wheel well.
- c. Place one 1-pound TNT charge or equivalent in right wheel well.
- d. Place one 1-pound TNT charge or equivalent behind instrument panel.
- e. Place one 1-pound TNT charge or equivalent as far aft in fuselage as possible.
- f. Ignite charges and take cover.

16-125. DESTRUCTION BY MECHANICAL MEANS.

16-126. Destruct aircraft mechanically as follows:

- a. Remove battery from aircraft, remove vent plugs, and turn battery upside down.
- b. Remove engine cowlings and smash magneto contact breaker assemblies; break spark plugs.
- c. Cover instruments with cloth and smash all instruments.
- d. Remove covers from signal electronic equipment and smash controls, tubes, coils, switches, capacitors, and transformers. Cut output and power cable and smash rf shield. Bury or scatter destroyed parts in slit trenches or foxholes; or throw them in a lake, stream, or other body of water.
- e. Break off pitot mast and all antennas.
- f. Cut all control cables.
- g. If heavy equipment is available, turn aircraft over on its back.

16-127. DESTRUCTION BY FIRE.

16-128. Destruct aircraft by fire as follows:

- a. Remove access panel over fuel tank drains, and open fuel tank drains.
- b. Fire a signal cartridge into gasoline underneath aircraft.
- c. If signal pistol is not available, collect a can of gasoline and lay a trail away from aircraft. Set end of gasoline trail alight, retire immediately from vicinity of aircraft, and seek cover.

NOTE

The fuel may also be ignited by removing the aircraft battery, ripping two lengths of electrical wiring from the aircraft, connecting each wire to a battery post, then creating a spark by bringing the ends of the wires together in the vapor of the gasoline trail.

APPENDIX A

REFERENCES

- | | |
|---------------------|--|
| AR 95-16 | Weight and Balance - Army Aircraft. |
| AR 750-5 | Organization, Policies, and Responsibilities for Maintenance Operation. |
| FM 5-25 | Care and Handling of Explosives. |
| FM 55-413 | Aerial Recovery of US Army and Air Force Aircraft |
| TB 746-93-2 | Painting and Marking of Army Aircraft. |
| TB 55-1500-308-25 | First Aid Kit Airplane, Without Narcotics. |
| TB 55-1500-301-25 | Army Aircraft Preventative Maintenance Inspection |
| TM 1-U8-S | Preparation for Shipment of U-8 Aircraft. |
| TM 1-42B-1-7 | General Use of Aircraft and Electronic Lubricants. |
| | |
| TM 11-521 | Marker Beacon Receiving Set AN/ARN-12. |
| TM 11-525-25 | Maintenance Instructions: Radio Set ARC Type 12. |
| TM 11-1510-201-20-1 | Organizational Maintenance Manual: Army Model RU-8D Aircraft. |
| TM 11-1510-201-35-1 | DS, GS and Depot Maintenance Manual: Electronic Equipment Configuration Army Model RU-8D Aircraft. |
| TM 11-5558 | Gyro Magnetic Compass Set AN/ASN-13. |
| TM 11-5820-518-12 | Operator and Organizational Maintenance Manual: Radio Set AN/ARC-51X and AN/ARC-51BX. |
| TM 11-5820-870-12 | Operator and Organizational Maintenance Manual: Radio Set AN/ARC-131. |
| TM 11-5821-202-12 | Operator and Organizational Maintenance Manual: Radio Set AN/ARC-59(V). |
| TM 11-5821-204-12 | Operator and Organizational Maintenance Manual: Radio Set AN/ARC-44. |
| TM 11-5821-207-12P | Operator and Organizational Maintenance Repair Parts and Special Tools List: Radio Transmitter T-366. |
| TM 11-5821-217-12 | Operator and Organizational Maintenance Manual: Radio Set AN/ARC-73. |
| TM 11-5821-225-10 | Operator's Manual: Radio sets AN/ARC-27, AN/ARC-27A, AN/ARC-55, AN/ARC-55A, and AN/ARC-55B. |
| TM 11-5821-244-12 | Operator and Organizational Maintenance Manual: Radio Set AN/ARC-54. |
| TM 11-5821-248-12 | Operator and Organizational Maintenance Manual: Radio Set AN/ARC-102. |
| TM 11-5821-248-20P | Organizational Maintenance Repair Parts and Special Tools List: Radio Set AN/ARC-102. |
| TM 11-5821-277-25-1 | Organizational, DS, GS, and Depot Maintenance Manual: Receiver-Transmitter RT-857/ARC-134 and Mounting MT-3791/ARC-134 (Part of Radio Set AN/ARC-134). |
| TM 11-5821-277-25-2 | Organizational, DS, GS, and Depot Maintenance Manual: Radio Set Control C-7197/ARC-134). |
| TM 11-5826-200-12 | Operator and Organizational Maintenance Manual: Receiver Group AN/ARA-54. |
| TM 11-5826-204-12 | Organizational Maintenance Manual: Direction Finder Set AN/ARN-59 (V). |
| TM 11-5826-205-34 | Field Maintenance Manual: Marker Beacon Receiving Set AN/ARN-12. |

TM 11-5826-207-24	Organizational and Field Maintenance: Radio Receiving Sets AN/ARN-30A, AN/ARN-30B, and AN/ARN-30.
TM 11-5826-208-12	Operator and Organizational Maintenance Manual: Receiving Set Radio AN/ARN-68.
TM 11-5826-215-12	Operator and Organizational Maintenance Manual: Radio Receiving Sets AN/ARN-30D and AN/ARN-30E.
TM 11-5826-235-20	Organizational Maintenance Manual: TACAN Navigation Set AN/ARN-52 (V).
TM 11-5831-201-12	Operator and Organizational Maintenance Manual: Control Intercommunications Set C-1811()/AIC.
TM 11-5841-241-12	Operator's and Organizational Maintenance Manual: Radar Set AN/APN-158.
TM 11-5841-241-35	Field and Depot Maintenance Manual: Radar Set AN/APN-158.
TM 11-5895-217-12	Operator and Organizational Maintenance Manual: Transponder Set AN/APX-44.
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TM 11-5895-490-20P	Organizational Maintenance Repair Parts and Special Tools List: Transponder Set AN/APX-72.
TM 11-6140-203-15-2	Operator and Organizational Maintenance Manual, Battery, Storage BB-432/A. (NICAD)
TM 38-750	Army Equipment Record Procedures.
TM 55-1500-204-25/1	Army Aviation Maintenance Engineering Manual.
TM 55-1500-328-25	Aeronautical Equipment Maintenance Management Policies and Procedures
TM 55-1510-201-ESC	Equipment Serviceability Criteria for Utility Aircraft U-8D and F.
TM 55-1510-201-10/4	Operator's Manual: Army Model U-8D, U-8G, and RU-8D.
TM 55-1510-201-CL-4	Operator's and Crew Member's Checklist: Army Model U-8D, U-8G and RU-8D; Pilot's Checklist.
TM 55-1510-201-10/5	Operator's Manual: Army Model U-8F.
TM 55-1510-201-CL-5	Operator's and Crew Member's Checklist Army Model U-8F: Pilot's Checklist.
TM 55-1510-201-20P	Organizational Maintenance Repair Parts and Special Tools List.
TM 55-1510-201-PMS	Preventive Maintenance Services.
TM 55-405-9	Army Aviation Maintenance Engineering Manual: Weight and Balance.
TM 750-143	Procedure for Rapid Deployment, Redeployment and Retrogradation of U.S. Army Fixed Wing Aircraft.
TM 750-199	Procedure for Rapid Redeployment and Retrogradation of U.S. Army Aircraft Components, Spare Parts, and Support Equipment (Class II (A) Class IV (A) Supplies.)
TM 55-412	Fundamentals of Aircraft Instruments.
TM 55-416	Aircraft Maintenance Management and Production Control.
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TM 55-1510-201-10/5	Operator's Manual: Army Model U-8F.
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TM 55-1510-201-20P	Organizational Maintenance Repair Parts and Special Tools List
TM 55-1510-201-20PMD	Preventive Maintenance Daily Inspection Checklist.
TM 55-1510-201-20PMI	Preventive Maintenance Intermediate Inspection Checklist
TM 55-1510-201-20PMP	Preventive Maintenance Periodic Inspection Checklist
TM 55-405-9	Army Aviation Maintenance Engineering Manual: Weight and Balance.
TM 750-143	Procedure for Rapid Deployment, Redeployment and Retrogradation of U.S. Army Fixed Wing Aircraft.
TM 750-199	Procedure for Rapid Redeployment and Retrogradation of U.S. Army Aircraft Components, Spare Parts, and Support Equipment (Class II (A) Class IV (A) Supplies.)

APPENDIX B

MAINTENANCE ALLOCATION CHART

B-1. GENERAL.

a. The Maintenance Allocation Chart assigns maintenance functions to the lowest level of maintenance based on past experience and the following consideration:

- (1) Skills available
- (2) Time required
- (3) Tools and test equipment required and/or available.

b. Only the lowest level of maintenance authorized to perform a maintenance function is indicated.

c. A maintenance function assigned to a maintenance level will automatically be authorized to be performed at any higher maintenance level.

d. A maintenance function that cannot be performed at the assigned level of maintenance for any reason may be evacuated to the next higher maintenance organization. Higher maintenance levels will perform the maintenance functions of lower maintenance levels when required or directed by the appropriate commander.

e. The assignment of a maintenance function will not be construed as authority to carry the associated repair parts in stock. Authority to requisition, stock, or otherwise secure necessary repair parts will be as specified in the repair parts appendix.

f. Normally there will be no deviation from the assigned level of maintenance. In cases of operational necessity, maintenance functions assigned to a maintenance level may, on a one-time basis and at the request of the lower maintenance level, be specifically authorized by the maintenance officer of the level of maintenance to which the function is assigned. The special tools, equipment, etc., required by the lower level of maintenance to perform this function will be furnished by the maintenance level to which the function is assigned. This transfer of a maintenance function to a lower maintenance level does not relieve the higher maintenance level of the responsibility of the function. The higher level of maintenance will provide technical supervision and inspection of the function being performed at the lower level.

g. Organizational through depot maintenance of the U.S. Army Electronics Command Equipment will be performed by designated U.S. Army Electronics Command personnel.

h. Changes to the Maintenance Allocation Chart

will be based on continuing evaluation and analysis by responsible technical personnel and on reports received from field activities.

B-2. DEFINITIONS.

a. Inspect: To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

b. Test: To verify serviceability and to detect electrical or mechanical failure by the use of test equipment.

c. Service: To clean, to preserve, to charge, and to add fuel, lubricants, cooling agents and air.

d. Adjust: To rectify to the extent necessary to bring into proper operating range.

e. Align: To adjust specified variable elements of an item to bring to optimum performance.

f. Calibrate: To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparison of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument or test equipment being compared with the certified standard.

g. Install: To set up for use in an operational environment such as an emplacement, site or vehicle.

h. Replace: To replace unserviceable items with serviceable assemblies, subassemblies or parts.

i. Repair: To restore an item to serviceable condition through correction of a specific failure or unserviceable condition. This includes, but is not limited to, inspection, cleaning, preserving, adjusting, replacing, welding, riveting and strengthening.

j. Overhaul: To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards prepared and published for the specific item to be overhauled.

k. Rebuild: To restore an item to a standard as nearly as possible to the original or new condition in appearance, performance, and life expectancy. This is accomplished through the maintenance technique of complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manu-

facturing tolerances and specifications and subsequent reassembly of the item.

B-3. SYMBOLS.

a. The symbols "O, F, H and D" represent Organization maintenance (O), Direct Support maintenance (F), General Support maintenance (H), and Depot maintenance (D) and when placed on the maintenance allocation chart, indicates the lowest level of maintenance responsible for performing the particular maintenance function. Maintenance levels higher than the level of maintenance marked by the symbol are author-

ized to perform the indicated function.

b. The symbol "%%" applies to organizational maintenance and indicates that the particular maintenance function may be performed provided it is specifically authorized by the direct support maintenance officer. In no case will the direct support maintenance officer require the accomplishment of a "%%" maintenance function by an organization or unit and in no case will a "%%" function authorize stockage of parts at organization level.

c. The symbol (*) in column 3 and 4 of the MAC denotes that a special tool is required to perform the indicated maintenance function.

d. The symbols (1) thru (11) in column 3 of the MAC refer to footnotes on pages (B-15 and B-16) of the MAC.

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE														
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS	
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL			REBUILD
00	AIRCRAFT													
	Clean													O
	Moor													O
	Tow													O
	Jack													O
	Preservation													O
	Weight & Balance													F
	Complete Painting													H
01	AIRFRAME													
	Sheet Metal & Structural Members Not Requiring Jigs & Fixtures	O							F	F				
	Sheet Metal & Structural Members Requiring Jigs & Fixture	O							H ₅	H ₅				
	Fuselage Assembly Windshields	O		O					F	F				
	Windshields Wiper Motors & Blade Drive Unit	O			O				O	F				
	Fairings, Cowlings, Access Doors & Panels	O			O				O	F				
	Windows, Fixed & Sliding	O		O	O				O	F				
	Doors	O			O				O	F				
	Hatches	O			O				O ¹²	F				

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE														
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS	
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL			REBUILD
01	Cockpit, Cabin Floors & Floor Access Panels	O							O	F				*Re- torque
	Entrances & Service Steps	O		O	O				O	F				
	Fuselage Furnishings Crew & Passenger Seats & Cushions	O		O	O				O	F				
	Seat Belts & Shoulder Harnesses	O	F	O					O					
	Inertia Reels	O	H						O					
	Curtains, Upholstery & Sound Proofing	O		O					O	F				
	Engine Mounts	O							F	F				
	Nose & Tail Cones	O							O	F				
	Wing Assembly Wing Bolts	O F			F*				F	F				
	Control Surfaces: Ailerons, Elevators, Rudders, Flaps, and Trim Tabs	O		O					O	F				
	Empennage Assembly: Vertical & Dorsal Fins, & Horizontal Stabilizers	O							F	F				
	02	LANDING OR ALIGHTING GEAR												
Retracting, Extension & Locking Mechanism		O	F ₁		F				F	F				
Mechanical Steering Mechanisms: Spindles, Housings & linkages		O			O				O	F				

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE													
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	
02	Shock Struts	O		O					F	F	H		
	Shimmy Dampers	O		O					O	F			
	Brake Installation Brake Assembly	O	O ₁	O	O				O	F	H		
	Wheel and Tire Assemblies	O		O					O	F			
	Wheel Disc Drive Keys	O							F				
03	POWER PLANT & RELA- TED SYSTEMS												
	Engine Assembly	O		O					F	F	D		
	Reduction Gear	O							F	F	D		
	Propeller Shaft Thrust Bearing Seal	O							F				
	Propeller Shaft Thrust Bearing (Gear Assy P/N 69728)		F						F				
	Propeller Shaft Thrust Nerring (Gear Assy P/N 72879)		F						H				
	Rocker Box Covers, Gas- kets, Baffles & Deflectors	O							O	F			
	Valves, Intake & Exhaust		O		O				D				

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE														
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS	
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL			REBUILD
03	Rocker Arms, Pushrods, Hydraulic Plunger, Push- rod Housing and Seals	O	O		O				O					
	Cylinder & Piston Assy	O	O						F	F	D			
	External Accessible In- serts, Studs & Drive Seals	O							F					
	Supercharger & Air Induction System													
	Air Inlet Ducts, Screens, Filters & Heat Compensator	O		O					O	F				
	Intake Pipes or Mani- folds	O							O	F				
	Supercharger Drain Valves	O		O					O					
	Supercharger Drive Shaft Seal								F					
	Supercharger Impeller Exhaust System	O							O	F				
	Engine Accessory Drives													
	Magneto Drive	O		O						D				
	Tachometer Drive	O		O						D				
	Fuel Pump Drive	O								D				
	Starter & Generator Drive	O		O						D				
	Hydraulic & Vacuum Pump Drives	O		O						D				

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE												
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD
03	Accessory Section											
	Accessory Drive Gear	O							D			
	Chip Detector Plug	O	O	O					O			
	Starter	O							O		H	
	Electrical & Ignition System											
	Spark Plugs	O	O	O	O				O	O		
	Ignition Harness	O	F						O	F		
	Magneto Assembly	O	O		O				O	F		
	Starting Vibrators & Booster Coils	O	F	O					O	F		
	Electrical Wiring	O							O	O		
	Fuel System											
	Fuel Injection Pump	O			O				O		D	
	Carburetor	O	H		O				O	F	H	
	Engine Driven Fuel Pump	O	O ₁	O	O				O		H ₃	
	Automatic Mixture Control	O							O		H	
	Supercharger Drive Shaft, Bearing & Impeller								D			
	Filters & Strainers	O		O					O			

MAINTENANCE ALLOCATION CHART
FOR
U-8 AIRPLANE

(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	
03	Lubrication System												
	Oil Sump & Gaskets	O							F				
	Oil Tanks	O		O					F	F			
	Oil Pump	O			O				F	H			
	Oil Cooler	O		O					O				
	Oil Filters	O		O					O				
	Regulators	O	O ₁	O					F		H		
	Valves: Divertor, Motor Operated Gate & Solenoid	O	O ₁	O					F	F		H	
	Valves: Relief, Shutoff & Drain	O	O ₁	O					O				
	Engine Controls	O			O				O	O			
	Control Linkages, Rods & Cables	O		O	O ₃				O	O			
	Vacuum System												
05	Pump	O		O					O		H		
	Valves, Drain Boxes & Separators												
	PROPELLERS & PROPELLER ACCESSORIES												
	Propeller Assembly	O		O	F ₁₁				F	F ₁₁	H ₃		
	Blades, Hubs & Domes	O								F ₁₁	H ₃		
	Governor	O		O	O				O		H		

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE													
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL		
05	Controls & Cylinders	O		O					O	O	H		
	Anti-Ice Compensator	O							F	F			
	Blade Shoe	O							F	F			
	Ring Anti-Ice	O							F	F			
	Bulkhead Assy	O							F	F			
	Spinner	O							O	F			
06	HYDRAULIC SYSTEM												
	Dual Hydraulic Brake	O							O				
	Plumbing Installation	O							O				
	Reservoir	O		O					O				
	Cap	O							O				
	Hose Assemblies	O							O				
	Fittings	O							O				
	Brake Master Cylinder	O	O ₁	O					O	F			
	Shuttle & Parking												
	Brake Valves	O							O	F			
08	AIRCRAFT INSTRUMENTS												
	Flight & Navigation												
	Airspeed Indicator	O	F	O					F		H		
	Altimeter	O	F	O			H		F		H		
	Rate of Climb												
	Vertical Velocity Ind.	O	F	O					F		H		
	Instantaneous Vertical												
	Speed Ind.	O	F	O					F		H		
	Compass, Standby	O	O	O			O ₈		O				
	Attitude Indicator	O		O					O		H		
	Turn & Slip Indicator	O		O					O		H		
	Directional Gyro Ind.	O		O					O		H		

MAINTENANCE ALLOCATION CHART FOR U-B AIRPLANE													
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL		
08	Course Selector Ind.	O		O					O				Note 9
	Pitot/Static System	O	F	O					O				
	Pitot Tube	O	F ₁	O					O				
	Engine Instruments												
	Cylinder Head Tem- perature Ind.	O		O					O				
	Carburetor Air Tem- perature Ind.	O		O					O		H		
	Oil Pressure, Oil Temp & Fuel Pressure Ind. (Engine Gauge Unit)	O		O					O		H		
	Engine Tachometer	O	F	O					O		H		
	Miscellaneous Instru- ments												
	Clock	O		O					O				
	Free Air Temp. Ind.	O		O					O				
	Vacuum Gauge	O	F	O					O				
	Flap Position Ind.	O		O					O				
	Volt, Amp & Load Meters	O		O					O				
	Transmitters, Sensing Units & Tach Generators												
Transmitters, Pres- sure & Position	O		O					O					
Temperature Sensing Bulbs & Thermocouples	O							O					
Tachometer Generators	O	F						O					

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE													
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	
08	Fuel Quantity Measuring System	O	O				O						
	Fuel Quantity Ind.	O		O					O		H		
	Fuel Quantity Transmitter	O							O				
	Tanks Sensor, Probes & Units	O							O		H		
09	ELECTRICAL SYSTEM, MAIN (AC&DC)												
	Switches, Circuit Breakers, Shock Mounts, Fuses	O							O				
	Receptacle, Conduits, Leads, Connectors, Plugs	O							O	O			
	Relays, Shunts, Rheostats, Flasher Units, Warning Horn	O							O				
	DC Components												
	Battery	O		O					O				
	Generators	O	O ₁						O	F	H		
	Motors & Actuators	O			O				O	F	H		
	Magnetic Brake	O							O	F	H		
	Voltage Regulator	O	O ₁		O				O				
	Exterior Lighting System												
	Taxi, Wing Position, Anti-Collision	O		O					O	F			

Note
13

MAINTENANCE ALLOCATION CHART FOR U-B AIRPLANE													
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL		
09	Landing & Search Lights	O		O	O				O	F	H		
	Interior Lighting System												
	Instrument, Utility, Warning, Caution & Panel Lights	O							O	O			
	AC Components												
	Inverters	O							O				Note 9
	Transformers & Rectifiers	O							O	F	H		Note 10
	Alternators	O	O ₁						O	F	H		
10	FUEL SYSTEMS, MAIN												
	Tanks & Cells	O	F	O					F	F			
	Pumps: Boost	O	O ₁						O		H		
	Valves, Motor Operated Gate Selector	O							O	F	H		
	Valves: Drain, Shutoff	O							O				
	Screens, Filters & Strainers	O		O/H ₇					O				
11	FLIGHT CONTROLS SYSTEM												
	Bellcranks, Torque Tubes, & Quadrants	O	O ₁		O ₃				O				
	Push-Pull Rods, Links & Rod end Bearings	O	O ₁		O ₃				O				

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE													
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL	REBUILD	
11	Control Cables & Pulleys	O	O ₁		O ₃				O				
	Pedestal	O							O				
	Console	O							O				
	Control Wheels & Column Mechanism	O	O ₁		O ₃				O	F			
	Foot Pedal Mechanism	O	O ₁		O ₃				O	F			
12	UTILITY SYSTEMS												
	Heater Units	O	O ₁	O					O	F			
	Blowers	O		O					O	F			
	Heater Fuel Control	O							O	F			
	Valves: Solenoid & Manual	O							O				
	Ignition Unit	O							O	F	H		
	Fuel Filters	O		O					O				

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE													
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL		
12	Temperature Controls	O							O	F			
	Air Pressure Switches	O							O				
	Anti-Icing & Heater Ducts	O							O	F			
	Anti-Icing System												
	Fluid Pumps, Valves & Tanks	O	O ₁	O					O	F			
	De-Icing Timers, and & Valves	O			O				O	F	D		
	De-Icing Boots	O	O ₁						F	F			
	Oxygen System Components	O		O					O	F	H		
16	COOLING SYSTEM, MAIN												
17	CARGO & PERSONNEL HANDLING												
	Troop Seats & Tiedown Assemblies	O		O					O	F			
19	AVIONICS EQUIPMENT												
	Communications & Navigation												Note 9
20	RECONNAISSANCE EQUIPMENT												Note 9
30	ARMAMENT EQUIPMENT												Note
60	BULK MATERIALS LIST												
70	MAINTENANCE SUPPLIES												
	Dye Penetrant Inspection												O

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE													
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL		
70	MAINTENANCE SUPPLIES (CONT'D) Magnaflux and Hardness Testing Heat Treat Cleaning Preservation & De- preservation Cadmium Plating Chrome Plating Spot Painting Welding & Brazing NOTES 1). Maintenance Operational Check, (Ref. TB 55-1500 -311-25), 2). Tracking 3). Rigging 4). Balance 5). Normally depot Function, however, where facilities, skills, equipment and test capabilities are author- ized at II level, this func- tion is authorized. 6). Pretrack Rigging												F H ₅ O O H ₅ H ₅ O F

MAINTENANCE ALLOCATION CHART FOR U-8 AIRPLANE													
(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENANCE FUNCTION										(4) TOOLS AND EQUIPMENT	(5) REMARKS
		INSPECT	TEST	SERVICE	ADJUST	ALIGN	CALIBRATE	INSTALL	REPLACE	REPAIR	OVERHAUL		
	NOTES (CONT'D) 7). Sonic Cleaning of Re-Usable Porous Filters 8). Compass Swing 9). For all Maintenance Allocations and Functions refer to the Maintenance Allocation Chart in applicable TM. 10). If the transformers and rectifiers are not TSARCOM managed items, use Note 9. 11). Repairs and adjustments that require disassembly of hub or loosening of blade clamps must be accomplished at H, or above 12). Windows that are riveted to airframe to be replaced at F level. 13). Refer to TM 11-6140-203-14-2.												

APPENDIX C

AIRCRAFT INVENTORY MASTER GUIDE

C-1. INTRODUCTION.

C-2. Appendix III lists those items of installed or loose equipment required by and authorized for using organizations to accomplish their primary or alternate mission. This list will serve to standardize present inventory procedures, using the inventory master guide to determine the inventoriable items of installed and/or loose equipment. Insofar as possible, items of equipment are listed in the sequence of their physical location within the aircraft area.

Aircraft inventory is subject to change as a result of authorized changes (MWO's) and additions or deletions of property for special missions requirements; therefore, the selection of items of inventory from the inventory master guide may or may not provide a complete inventory list. When it is known that the master guide does not provide a complete inventory list, it will be necessary to research authorized changes (MWO's) and local command directives in order to compile an accurate and exact inventory list.

When the compilation of the inventory list is accomplished, this list will be entered on DA Form 2408-17, Aircraft Inventory Record. For preparation and use of this form, refer to TM 38-750.

C-3. SECURITY.

C-4. It is desired that aircraft inventory records be unclassified. Therefore, when equipment bearing a security classification or the installation of unclassified equipment is of a confidential or secret nature, accomplishment of the classification will be in accordance with existing security regulations.

C-5. INVENTORIAL ITEMS.

C-6. The selection of inventoriable items is without regard to the agency, governmental or contractual, furnishing the items.

a. Items to be listed are:

(1) Items essential to the execution of the

designated mission of the aircraft, such as electronic, photographic, armament, special mission instruments, and safety and comfort equipment.

(2) Loose equipment delivered with the aircraft and items subject to pilferage or readily converted to personal use.

(3) Modification kits which are issued or distributed to using organizations for installation and which are not immediately placed in work will be recorded on the affected aircraft's DA Form 2408-17, Aircraft Inventory Record, and identified as loose equipment until modification is completed.

(4) Equipment required for operation in special environment.

b. Items to be excluded are:

(1) Nonaccountable items coded as expendable in the applicable stock lists.

(2) Personal issue or furnished on unit allowance or other authority.

(3) Items or components considered as basic or integral parts of the airframe or basic aircraft, such as engines, propellers, wheels, and standard instruments.

(4) Technical publications, checklists, and aircraft forms.

C-7. PERIODS OF INVENTORY.

C-8. Inventoriable items will be checked against the Aircraft Inventory Record (DA Form 2408-17) at the following periods:

a. Upon receipt of the aircraft.

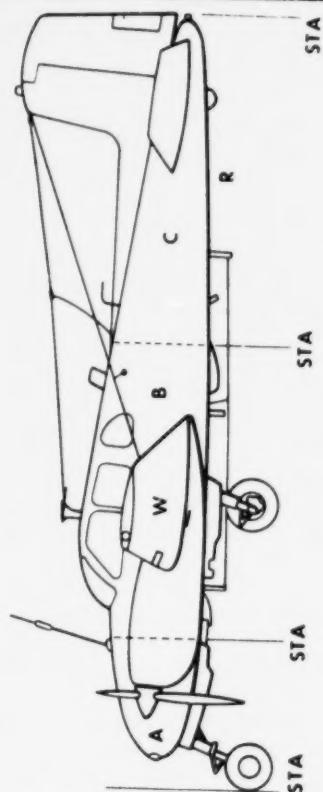
b. Prior to transfer of the aircraft to another organization.

c. Upon placing aircraft in storage and upon removing from storage. Aircraft need not be inventoried while in storage.

d. Twelve months elapsed time since last inventory.

e. Loose equipment shipped under separate cover are inventoried upon transfer by the sending activity and immediately upon receipt by the receiving activity.

C-9. INVENTORY ITEMS LIST.



STA 00.0 TO 73.0 ON U-8D, U-8G, AND RU-8D
STA 00.0 TO 84.0 ON U-8F

STA 73.0 TO 211.0 ON U-8D, U-8G, AND RU-8D
STA 84.0 TO 277.0 ON U-8F

STA 211.0 TO 379.5 ON U-8D, U-8G, AND RU-8D
STA 277.0 TO 415.96 ON U-8F

W - WINGS, INCLUDING NACELLES

NOTE: ONLY THOSE ITEMS LISTED WHICH ARE INSTALLED OR ASSIGNED TO A PARTICULAR AIRCRAFT ARE TO BE LISTED ON DA FORM 2408-17, AIRCRAFT INVENTORY RECORD, FOR THE AIRCRAFT.

NOMENCLATURE

SECTION A - - - NOSE COMPARTMENT

GYROSYN AMPLIFIER SPERRY 65895
RECEIVER-TRANSMITTER RT-349/ARC-55
RECEIVER WITH DYNAMOTOR R-445/ARN-30
AND DY-86/ARC
RECEIVER R-1021 ()/ARN-30D
MARKER BEACON RECEIVER R-666()/ARN-32
TRANSMITTER 17L-4
RECEIVER WITH DYNAMOTOR R-508()/ARC
POWER UNIT TYPE P-14A DY-150/ARN
DYNAMOTOR DY-107/AR
POWER UNIT WITH DYNAMOTOR P-12 and D-10
AMPLIFIER AN 1514/ASN 653895
RECEIVER R-122A/ARN-12

AIRCRAFT SERIES AND NUMBER OF ITEMS NORMALLY INSTALLED						LOCATION OR REMARKS
U-8D		RU-8D	U-8G	U-8F		
STD	ASAC			STD	ASAC	
1				1	1	NOTE 2 NOTE 1
1	1			1		
1				1		
						NOTE 2
1		1		1	1	
1	1			1	1	
1						NOTE 2
1	1			1	1	
1	1			1	1	

NOTE: ONLY THOSE ITEMS LISTED WHICH ARE INSTALLED OR ASSIGNED TO A PARTICULAR AIRCRAFT ARE TO BE LISTED ON DA FORM 2408-17, AIRCRAFT INVENTORY RECORD, FOR THE AIRCRAFT.	AIRCRAFT SERIES AND NUMBER OF ITEMS NORMALLY INSTALLED						LOCATION OR REMARKS
	U-8D		RU-8D	U-8G	U-8F		
	STD	ASAC			STD	ASAC	
SECTION A - - - NOSE COMPARTMENT							
RECEIVER R-836/ARN-59	1		1		1	1	NOTE 2
GLIDESLOPE RECEIVER R-746/AR MN-100A					1	1	
TRANSMITTER 17L-7A VHF AN/ARC-73	1				1		
RECEIVER 51X-2B VHF AN/ARC-73	1				1		
RECEIVER R-836()/ARN or ARC R-30A AN/ARN-59	1		1		1	1	NOTE 2
RECEIVER-TRANSMITTER RT-349/ARC-55	1				1		
RECEIVER-TRANSMITTER RT-294/ARC-44	1				1		
RADIO SET CONTROL C-1827/ARC-55	1			1	1		NOTE 6
TRANSMITTER T-879/ARC	1			1	1		NOTE 6
RECEIVER R-1123/ARC	1				1		
CONTROL C-4074/ARC	1				1		
INDICATOR ID-637/ARN	1				1		
INDICATOR ID-718/ARN	1				1		
RECEIVER R-1021/ARN	1				1		
CONVERTER CV-265/ARN	1	1	1		1	1	NOTE 2
CONVERTER CV-1275/ARN	1	1	1		1	1	NOTE 2
RECEIVER-TRANSMITTER RT-380/AR	1	1	1		1	1	NOTE 2
IMPEDANCE NETWORK CU-991/AR	1				1		
COUPLER CU-1658A	1		1		1		
CONTROL C-1982	1				1		
RECEIVER R-1041A/ARN	1			1	1	1	NOTE 1
RECEIVER-TRANSMITTER, RT-494/APX	1				1		
TRANSMITTER T-366/ARC							
CONTROL C-80B	1				1		
CONTROL C-2065/AR	1				1		
INDICATOR ID-567/ASN	1	1			1	1	
RECEIVER-TRANSMITTER RT-857/ARC-134							

NOTE: ONLY THOSE ITEMS LISTED WHICH ARE INSTALLED OR ASSIGNED TO A PARTICULAR AIRCRAFT ARE TO BE LISTED ON DA FORM 2408-17, AIRCRAFT INVENTORY RECORD, FOR THE AIRCRAFT.	AIRCRAFT SERIES AND NUMBER OF ITEMS NORMALLY INSTALLED						LOCATION OR REMARKS
	U-8D		RU-8D	U-8G	U-8F		
	STD	ASAC			STD	ASAC	
SECTION A - - - NOSE COMPARTMENT							
AMPLIFIER AM-1515/ASN	1	1			1	1	NOTE 4
INVERTER 1-101A-115S-7	2				2		
RECEIVER R-836/ARN-59			1	1			
INVERTER PU-543				2			
RECEIVER-TRANSMITTER RT-348/ARC-54		1	1	1		1	NOTE 4
RECEIVER-TRANSMITTER RT-742()/ARC-51BX		1	1	1			
SERVO AMPLIFIER AM-3209/ASN		1	1	1		1	
RECEIVER-TRANSMITTER RT-857/ARC-134		1		1			
RECEIVER-TRANSMITTER RT-711/APN-158					1	1	NOTE 4
ANTENNA AS-1520/APN-158					1	1	
SYNCHRONIZER SN-358/APN-158					1	1	
INDICATOR ID-1003()/ARC		1					
COOLER HD-615()/ARC-51		1					NOTE 4
RECEIVER-TRANSMITTER RT-823/ARC-131		1				1	
DYNAVERTER PP-2792/ARN-30D			1				
CONVERTER CV-265A/ARN-30A			1				
TINER DEICER 42E06-9A			2				NOTE 4
INVERTER 1-100A-115S-7			2				
GYRO INVERTER 1-100A-115D-7			2				
SECTION B - - - PILOT'S COMPARTMENT AND CABIN							
CLOCK 1-7/8 inch DIAL TYPE A-13A	1	1	1	1	1	1	
CONTROL SURFACE AND LOCK ASSEMBLY 50-524257-17	1	1	1	1			
LIGHTER ELEMENT AND KNOB LPA-30487	1	1	2	1	1	1	
AERONAUTICAL FIRST AID KIT	1	1	1	1			
SELF-INDICATING THERMOMETER MS28028-1	1	1	1	1	1	1	
FIRE EXTINGUISHER CF3BR	1	1	1	1			
HEADSET AND MICROPHONE H-101/U or H-78B/AIC	2	2	3	2			
MICROPHONE M-32/AIC	2	2	2	2			
AIRCRAFT LAP SAFETY BELT TYPE B-18	2	2	4		2	2	
SHOULDER SAFETY HARNESS TYPE G-1	2	2	2		2	2	
LAP AND SHOULDER COMBINATION SAFETY BELT ASSEMBLY 50-534102 or 50-534269-1	2	2	2				
	1	1					

NOTE: ONLY THOSE ITEMS LISTED WHICH ARE INSTALLED OR ASSIGNED TO A PARTICULAR AIRCRAFT ARE TO BE LISTED ON DA FORM 2408-17, AIRCRAFT INVENTORY RECORD, FOR THE AIRCRAFT.	AIRCRAFT SERIES AND NUMBER OF ITEMS NORMALLY INSTALLED						LOCATION OF REMARKS
	U-8D		RU-8D	U-8G	U-8F		
	STD	ASAC			STD	ASAC	
SECTION B- - PILOT'S COMPARTMENT AND CABIN							
OXYGEN MASK WITH MICROPHONE PROVISIONS	2	2		2			
TYPE A-8B, 312-4001-800							
OXYGEN MASK 28301-12	3	3		4			
LAP AND SHOULDER COMBINATION SAFETY BELT ASSEMBLY 50-534131-16 or 50-534269-3	3	3	3				
TOW BAR ASSEMBLY 50-590001	1	1	1	1	1	1	
LIGHTER ELEMENT AND KNOB LPA-27630							
SELF-INDICATING THERMOMETER 35-380019			1		1	1	
HAND OPERATED MICROPHONE M-34 ()/AIC			2	2	2	2	
CONTROL SURFACE LOCK ASSEMBLY 50-590122-1	2	2			1	1	
COMPASS ASSEMBLY C-2400-LAYF-35-50					1	1	
OXYGEN MASK WITH MICROPHONE M-32/AIC					2	2	
50-56001-23					2	2	
HEADSET AND MICROPHONE H-101/U					4	4	
SAFETY BELT ASSEMBLY 414-183389-41					1	1	
RUDDER LOCK ASSY 50-521186-21	1	1	1	1	1	1	
RELIEF TUBE	1	1	1	1	1	2	
MX-1646/AIC INTERCOMMUNICATION SET							
CONTROL C-7197/ARC-134		1		1		1	NOTE 5
INDICATOR ID-453/ARN	1	1	1	2		1	NOTE 7
CONTROL C-2714/APX		1	1	1		1	
INDICATOR ID-567/ASN		1		1		1	
CONTROL C-6287 ()/ARC-51BX		1	1	1		1	NOTE 2
CONTROL C-2010/ARN-52		1		1		1	NOTE 3
INDICATOR ID-663C/U		1		1		2	NOTE 2
INDICATOR ID-250		1		1		1	
INDICATOR ID-387/ARN		1	1	1		1	NOTE 8
CONTROL C-3436A/ARN		1	1	1		1	
INDICATOR ID-998/ASN		1	1	1		1	
CONTROL C-8157/ARC		1		1		1	
CONTROL C-1611 ()/AIC		2	3	2		2	

NOTE: ONLY THOSE ITEMS LISTED WHICH ARE INSTALLED OR ASSIGNED TO A PARTICULAR AIRCRAFT ARE TO BE LISTED ON DA FORM 2408-17, AIRCRAFT INVENTORY RECORD, FOR THE AIRCRAFT.	AIRCRAFT SERIES AND NUMBER OF ITEMS NORMALLY INSTALLED						LOCATION OR REMARKS
	U-8D		RU-8D	U-8G	U-8F		
	STD	ASAC			STD	ASAC	
SECTION B - PILOT'S COMPARTMENT AND CABIN RECEIVER-TRANSMITTER, RT-494/APX44 RECEIVER-TRANSMITTER, RT-698 POWER INVERTER, PP-3702/ARC-102 AMPLIFIER, POWER SUPPLY 2589226-1 FREQUENCY TRACKER OA-7400/APN-168 ROTORANCE GYRO, 2586333-1 COMPUTER, OA-7432/AYA-3 TOOL KIT ASSEMBLY, FLYAWAY ORGANIZATIONAL MAINTENANCE MANUAL TM 55-1510-201-20 BALUN BOX RECEIVER-TRANSMITTER APX-72 RECEIVER-TRANSMITTER RT 384/ARN-52							NOTE 7
		</					

NOTES:

1. Marker Beacon Receiver R-666()/ARN-32 installed in 1960 model U-8F ASAC aircraft; R-1041/ARN receiver in 1961 and 1962 model U-8F ASAC aircraft.
2. ASAC aircraft have one of the three following navigation system configurations:
 - a. One AN/ARN-59 ADF facility and two AN/ARN-30() VHF navigation facilities.
 - b. Two AN/ARN-59 ADF facilities and one AN/ARN-30E VHF navigation facility.
 - c. One AN/ARN-59() ADF facility, one AN/ARN-30E navigation facility and one AN/ARN-52 (V) TACAN navigation facility.
3. Either indicator ID-663C/U or ID-250() ARN may be used in ASAC aircraft with TACAN installation.
4. Radio Sets AN/ARN-54 and AN/ARC-131 are interchangeable on ASAC aircraft.
5. ID-453/ARN replaces ID-387/ARN when dual ARN-30 configuration is installed.
6. Mountings and wiring are installed in U-8G ACFT; equipment may or may not be installed.
7. Either the AN/APX-44 or AN/APX-72 system is installed in ASAC aircraft, and in RU-8D and U-8G aircraft.
8. Mountings and wiring are installed; equipment is installed only for special missions.

APPENDIX D

WEIGHT AND BALANCE

For general weight and balance information, refer to TM 55-405-9, Army Aviation Maintenance Engineering Manual, Weight and Bal-

ance. Appendix B, Maintenance Allocation Chart, should be consulted for responsibility of weighing and balancing of the aircraft.

APPENDIX E

ILLUSTRATED FIELD MANUFACTURE ITEMS LIST

E-1. INTRODUCTION.

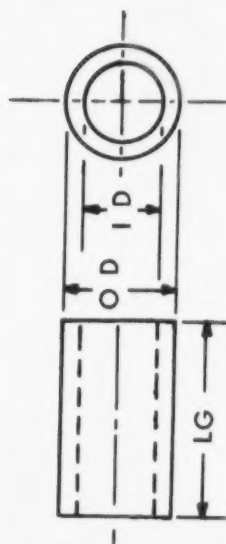
Source Code.

E-2. This appendix includes complete instructions, including bills of material, for field manufacture of all items listed in TM 55-1510-201-20P, Organization Maintenance Repair Parts and Special Tools List, bearing MO

The part number index lists all items in part number order with a cross-reference to the figure in which the item appears. All materials necessary for manufacture of an item are listed, by Federal Stock Number, in bill of material for the item.

PART NUMBER INDEX

Part Number	Figure Number	Part Number	Figure Number
MS25083-1AA6	E-8	1767-3-3130-2	E-22
MS25083-1AA8	E-8	102361-03630	E-18
MS27212-1-10	E-19	106043S12-08-060	E-1
50-080036-1	E-6	106043S12-08-570	E-1
50-120003-34	E-4	106043S12-08-670	E-1
50-120098-4	E-14	106200H4-8	E-21
50-120098-6	E-7	106200H8-84	E-21
50-364224-19	E-20	106200H16-28	E-21
50-440012-227	E-10	111192-02400	E-3
50-560001-21	E-17	111192-03400	E-3
50-910147-41	E-16	111716XX3-3	E-15
50-910238-3	E-2	111716XX3-24	E-15



PART NUMBER	NOMENCLATURE	FABRICATE FROM FSN	I D	O D	LG
106043S12-08-060	HOSE-RUBBER	4720-231-2483	0.375	0.625	6.000
106043S12-08-570	HOSE-RUBBER	4720-540-3644	0.375	0.625	57.000
106043S12-08-670	HOSE-RUBBER	4720-231-2483	0.375	0.625	67.000

Figure E-1

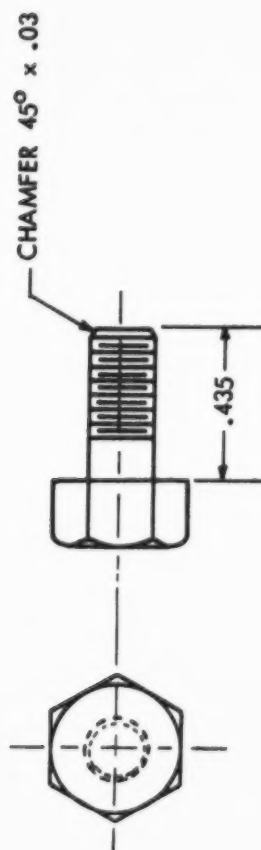
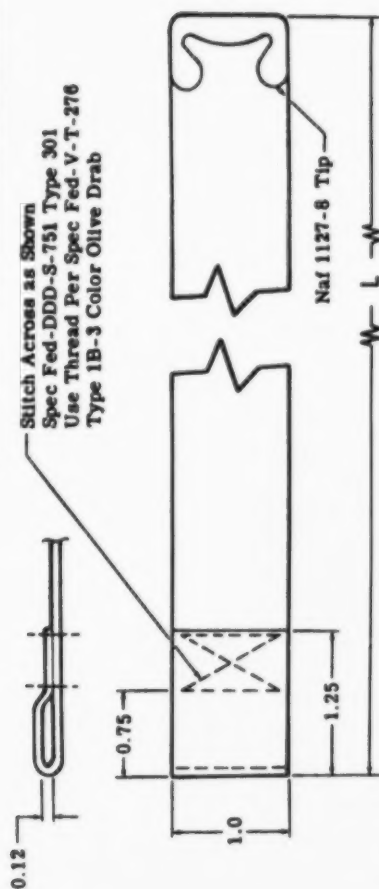


Figure E-2. Part number 50-910238-3 bolt fabricate from FSN 5306-720-8557

MATERIAL BLOCK			
STOCK SIZE	DESCRIPTION	SPECIFICATION	HEAT TREAT
AR	COT. WEBBING OLIVE DRAB-7	MIL-W-530A TYPE 3	



PART NUMBER	FABRICATE FROM FSN	LENGTH
111192-02400	8305-263-2477	24.00
111192-03400	8305-263-2477	34.00

Figure E-3. Strap assembly

MATERIAL BLOCK		
STOCK SIZE	DESCRIPTION	SPECIFICATION
.25 x .375 x .75	RUBBER SHEET, SOLID	MIL-R-6855
		CLASS II

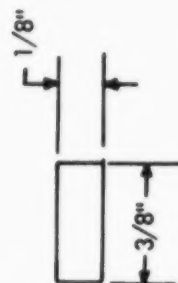
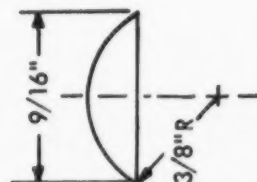


Figure E-4. Part number 50-120003-34 pad fabricate from FSN 9320-241-9763

Figure E-5. Deleted.

MATERIAL BLOCK			
STOCK SIZE	DESCRIPTION	SPECIFICATION	HEAT TREAT
61.5 LONG	CHAIN		

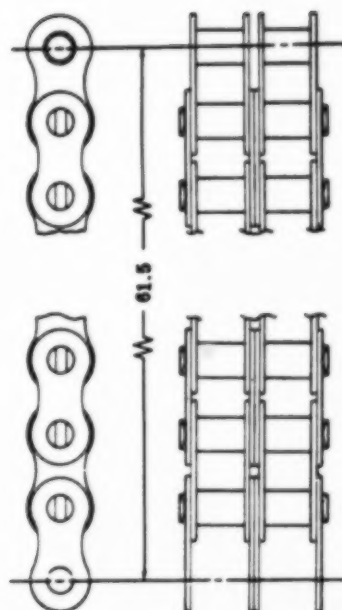


Figure E-6. Part number 50-080036-1 chain fabricate from FSN 4010-770-0010

MATERIAL BLOCK			
STOCK SIZE	DESCRIPTION	SPECIFICATION	HEAT TREAT
0.025 SHEET 0.86 X 0.86	2024-T3 AL ALLOY ALCLAD	FED-QQ-A-362 TEMPER T3	

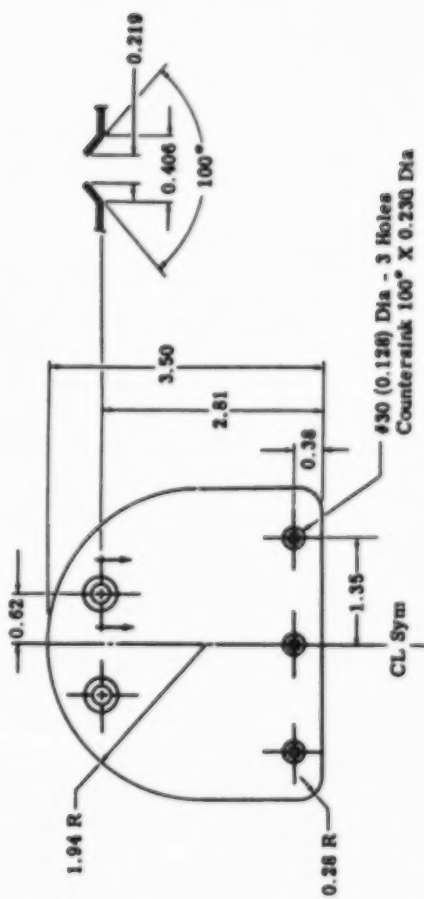
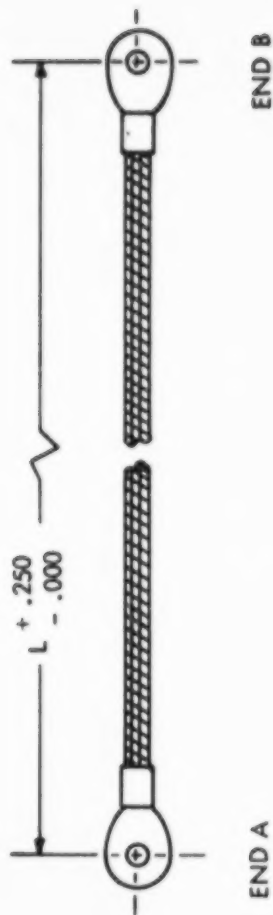


Figure E-7. Part number 50-120098-6 washer fabricate from FSN 9535-167-2278



PART NUMBER	WIRE	TERMINAL		L
		END A	END B	
MS25083-1AA6	6145-998-7609	5940-204-8990	5940-204-8990	6.00
MS25083-1AA8	6145-998-7609	5940-204-8990	5940-204-8990	8.00

Figure E-8. Jumper assembly

Figure E-9. Deleted.

MATERIAL BLOCK			
STOCK SIZE	DESCRIPTION	SPECIFICATION	HEAT TREAT
0.062 X 2.3 X 2.3	LEATHER	FED-KK-L-271 COLOR OPTIONAL	

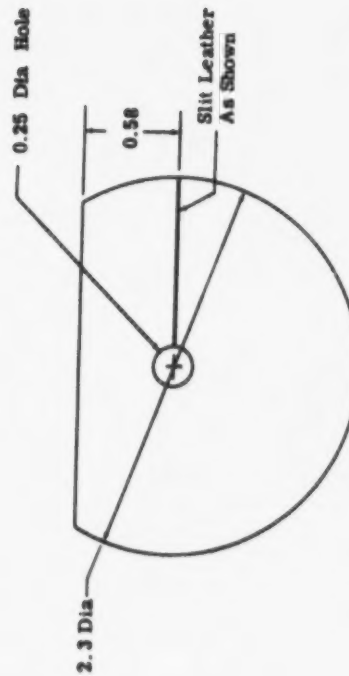


Figure E-10. Part number 50-440012-227 seal fabricate from FSN 1560-446-7550

Figure E-11. Deleted.

Figure E-12. Deleted.

Figure E-13. Deleted.

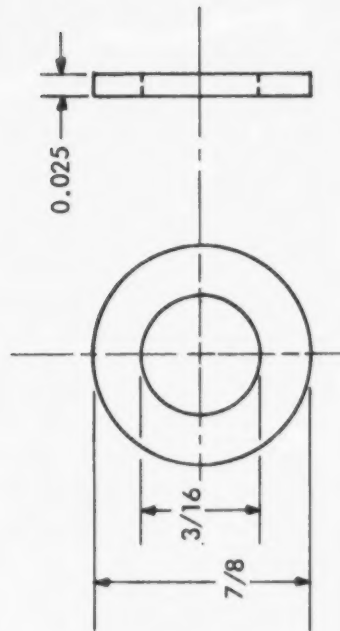
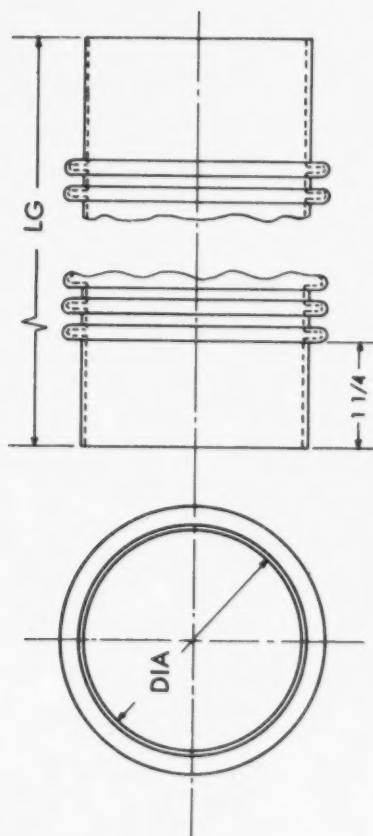


Figure E-14. Part number 50-120096-4 washer, fairing fabricate from FSN 9535-167-2278



PART NUMBER	FABRICATE FROM FSN	INSIDE DIA.	LENGTH
111716XX3-3	4720-736-0984	1.50	1.50
111716XX3-24	4720-736-0984	1.50	12.00

NOTE:

1. End Type - Straight
2. Max. Recommend Temp., 350°

Figure E-15. Hose, air duct

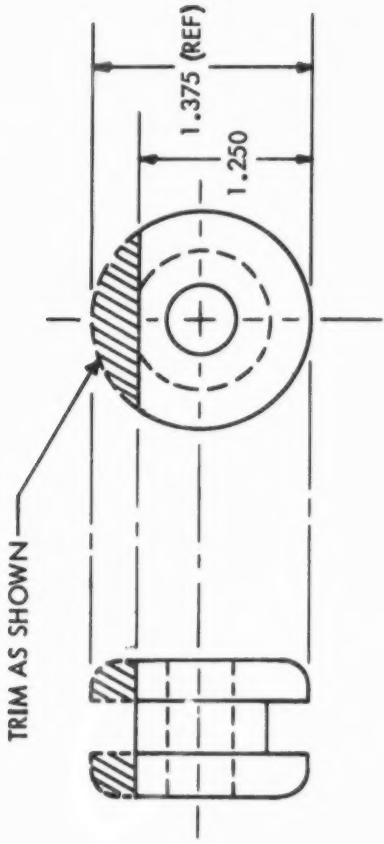
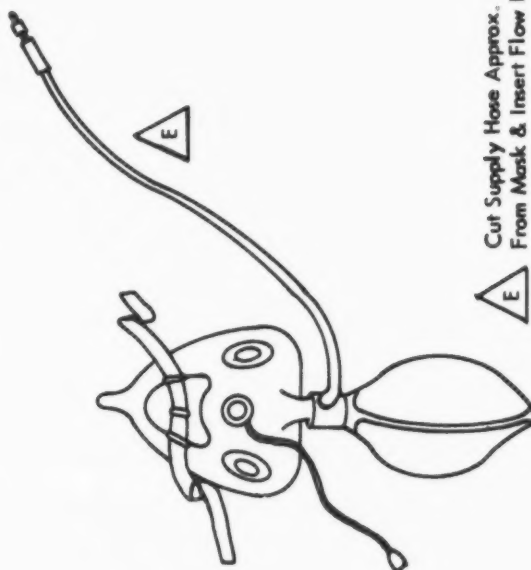


Figure E-16. Part number 50-910147-41 grommet fabricate from FSN 5325-174-9038

MATERIAL BLOCK			
STOCK SIZE	DESCRIPTION	SPECIFICATION	HEAT TREAT
	MASK, OXYGEN		



E Cut Supply Hose Approx. 12 Inches
From Mask & Insert Flow Indicator

Figure E-17. Part number 50-560001-21 mask, oxygen fabricate from FSN 1660-592-5492

MATERIAL BLOCK			
STOCK SIZE	DESCRIPTION	SPECIFICATION	HEAT TREAT
AS REQUIRED	.090 DIA WIRE	CRES. SPEC. FED QQ-A-423	

NOTE: Length "L" To Be 1/8" Shorter Than Hinge Length

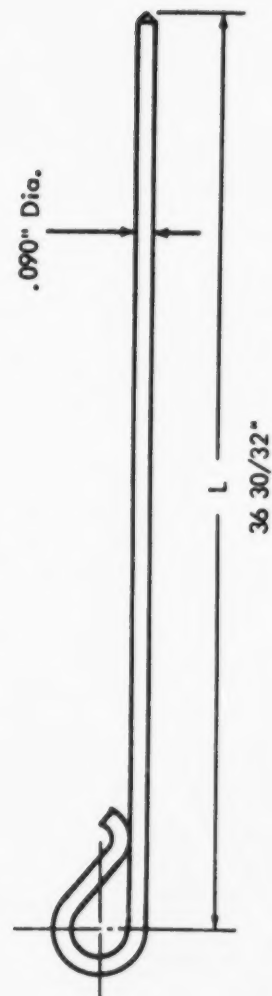
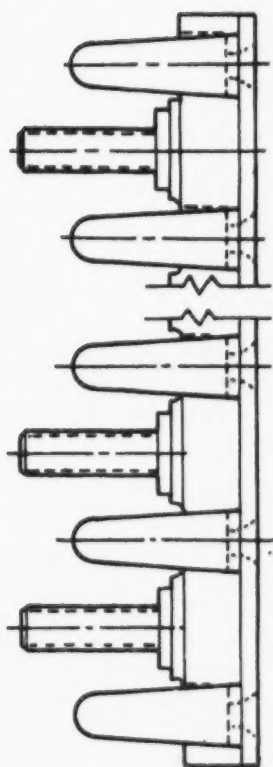


Figure E-18. Part number 102361-03630 pin, lock fabricate from FSN 9505-596-1662 material: 0.090 wire, CRES. Spec. FED QQ-A-423



PART NUMBER	FABRICATE FROM FSN
MS27212-1-10	5940-950-1610

NOTES:

1. LAST DASH NUMBER INDICATES NUMBER OF STUDS.
2. ALLOWANCE MUST BE MADE FOR THE LOSS OF ONE STUD FOR EACH CUT.

Figure E-19. Terminal board

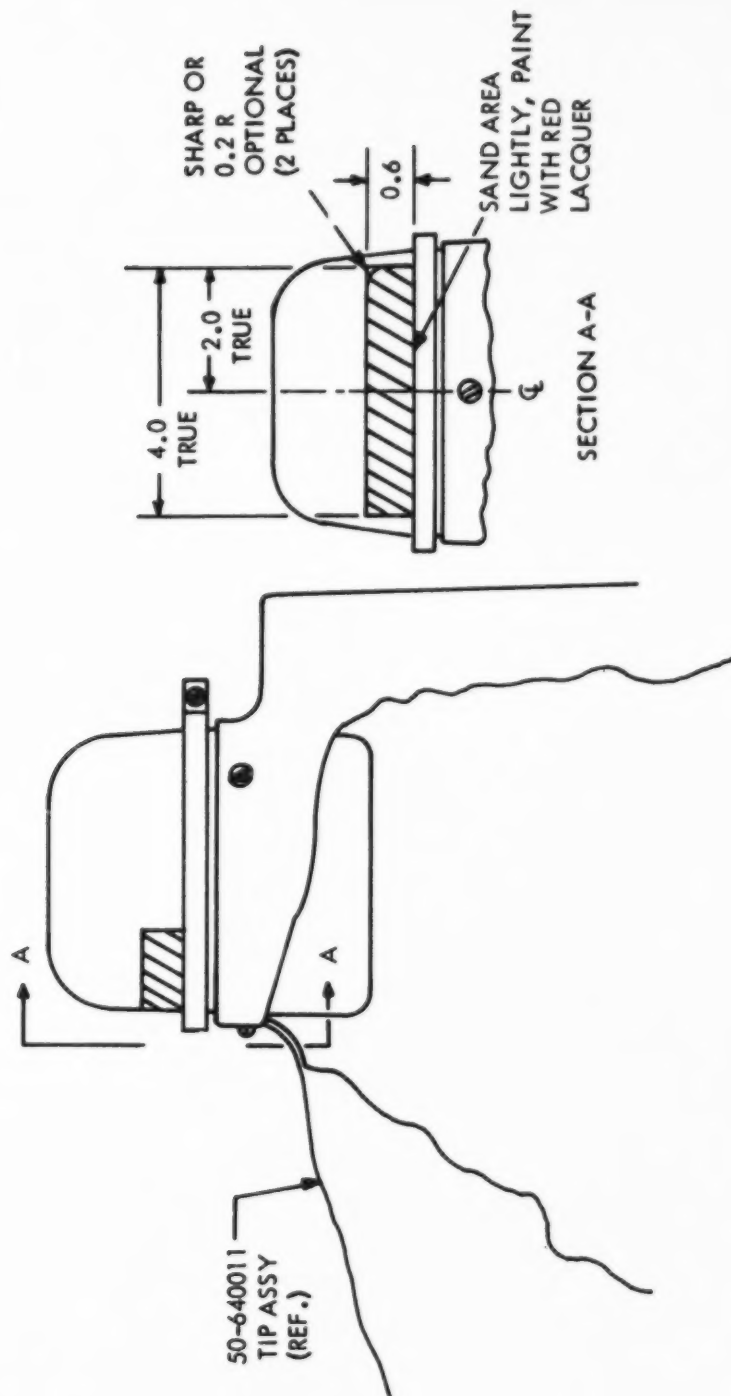


Figure E-20. Part number 50-364224-19 light assembly fabricate from FSN 6220-963-9359, 8010-251-6503

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